

Triangle Geometry

To duplicate the results of this benchmarking document exactly, build your triangle unit cell using the following code:

```
% INITIALIZE MATLAB
close all;
clc;
clear all;

% UNITS
meters = 1;
centimeters = 1e-2 * meters;
degrees = pi/180;

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% STEP 1: INITIALIZE PARAMETERS
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% SOURCE PARAMETERS
lam0 = 2 * centimeters;           %free space wavelength
theta = 60 * degrees;
phi = 30 * degrees;
pte = 1/sqrt(2);
ptm = 1i/sqrt(2);

% DEVICE PARAMETERS
ur1 = 1.0;                         %permeability in reflection region
er1 = 2.0;                         %permittivity in reflection region
ur2 = 1.0;                         %permeability in transmission region
er2 = 9.0;                         %permittivity in transmission region
urd = 1.0;                         %permeability of device
erd = 6.0;                         %permittivity of device
Lx = 1.75 * centimeters;          %period along x
Ly = 1.5 * centimeters;          %period along y
d1 = 0.5 * centimeters;          %thickness of layer 1
d2 = 0.3 * centimeters;          %thickness of layer 2
w = 0.8*Ly;

% RCWA PARAMETERS
Nx = 512;                          %number of point along x in real-space grid
Ny = round(Nx*Ly/Lx);              %number of point along y in real-space grid
PQ = 3 * [1 1];                    %number of spatial harmonics along x and y

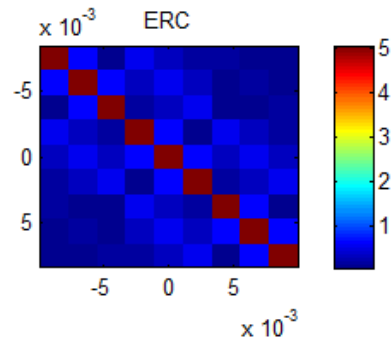
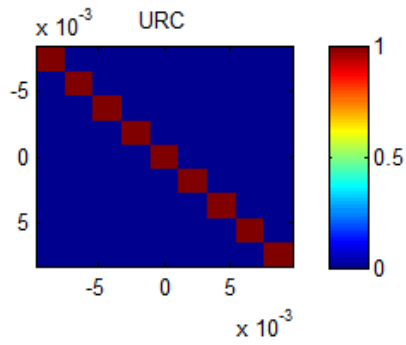
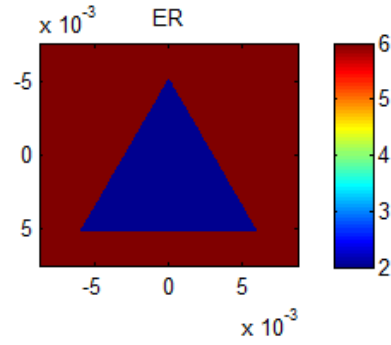
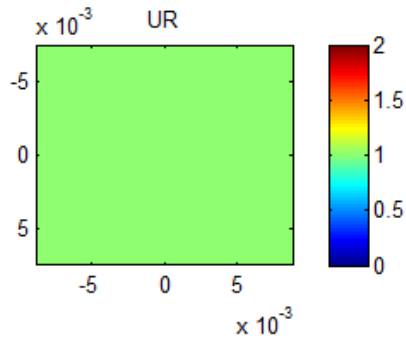
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% STEP 2: BUILD DEVICE LAYERS ON HIGH RESOLUTION GRID
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% CROSS SECTIONAL GRID
dx = Lx/Nx;                         %grid resolution along x
dy = Ly/Ny;                         %grid resolution along y
xa = [0:Nx-1]*dx;                   %x axis array
xa = xa - mean(xa);                 %center x axis at zero
ya = [0:Ny-1]*dy;                   %y axis vector
ya = ya - mean(ya);                 %center y axis at zero

% INITIALIZE LAYERS TO er AND ur
UR = urd * ones(Nx,Ny,2);
ER = erd * ones(Nx,Ny,2);

% BUILD LAYER 1 (TRIANGLE)
h = 0.5*sqrt(3)*w;
ny = round(h/dy);
ny1 = round((Ny - ny)/2);
ny2 = ny1 + ny - 1;
for ny = ny1 : ny2
    f = (ny - ny1)/(ny2 - ny1);
    nx = round(f*w/Lx*Nx);
    nx1 = 1 + floor((Nx - nx)/2);
    nx2 = nx1 + nx;
    ER(nx1:nx2,ny,1) = er1;
end
```

Data Visualization



The Data

```
*****
***** RCWA BENCHMARKING DOCUMENT *****
***** 3x3 Spatial Harmonics *****
*****
```

===== UNITS
 meters = 1

===== STEP 1: DASHBOARD

```
lam0 = 0.02
theta = 60 deg.
phi = 30 deg.
pte = 0.70711
ptm = 0+0.70711i
```

```
ur1 = 1
er1 = 2
ur2 = 1
er2 = 9
```

```
urd = 1
erd = 6
Lx = 0.0175
Ly = 0.015
d1 = 0.005
d2 = 0.003
w = 0.012
```

```
Nx = 512
Ny = 439
P = 3
Q = 3
```

===== STEP 2: BUILD DEVICE

```
dx = 3.418e-05
dy = 3.4169e-05
```

===== STEP 3: CONVOLUTION MATRICES

```
NH = 9
NLAY = 2
```

LAYER 1...

```
URC =
 1  0  0  0  0  0  0  0  0
 0  1  0  0  0  0  0  0  0
 0  0  1  0  0  0  0  0  0
 0  0  0  1  0  0  0  0  0
 0  0  0  0  1  0  0  0  0
 0  0  0  0  0  1  0  0  0
 0  0  0  0  0  0  1  0  0
 0  0  0  0  0  0  0  1  0
 0  0  0  0  0  0  0  0  1
```

```
ERC =
Columns 1 through 6
```

```
5.0449 + 0.0000i  0.6360 - 0.0020i -0.1402 + 0.0008i  0.3671 + 0.4094i -0.3056 - 0.1696i  0.1402 - 0.1531i
0.6360 + 0.0020i  5.0449 + 0.0000i  0.6360 - 0.0020i -0.3045 - 0.1715i  0.3671 + 0.4094i -0.3056 - 0.1696i
-0.1402 - 0.0008i  0.6360 + 0.0020i  5.0449 + 0.0000i  0.1421 - 0.1514i -0.3045 - 0.1715i  0.3671 + 0.4094i
0.3671 - 0.4094i -0.3045 + 0.1715i  0.1421 + 0.1514i  5.0449 + 0.0000i  0.6360 - 0.0020i -0.1402 + 0.0008i
-0.3056 + 0.1696i  0.3671 - 0.4094i -0.3045 + 0.1715i  0.6360 + 0.0020i  5.0449 + 0.0000i  0.6360 - 0.0020i
0.1402 + 0.1531i -0.3056 + 0.1696i  0.3671 - 0.4094i -0.1402 - 0.0008i  0.6360 + 0.0020i  5.0449 + 0.0000i
0.2044 + 0.0362i -0.0687 - 0.0222i -0.0733 - 0.0433i  0.3671 - 0.4094i -0.3045 + 0.1715i  0.1421 + 0.1514i
-0.0686 - 0.0227i  0.2044 + 0.0362i -0.0687 - 0.0222i -0.3056 + 0.1696i  0.3671 - 0.4094i -0.3045 + 0.1715i
-0.0727 - 0.0443i -0.0686 - 0.0227i  0.2044 + 0.0362i  0.1402 + 0.1531i -0.3056 + 0.1696i  0.3671 - 0.4094i
```

```
Columns 7 through 9
```

```
0.2044 - 0.0362i -0.0686 + 0.0227i -0.0727 + 0.0443i
-0.0687 + 0.0222i  0.2044 - 0.0362i -0.0686 + 0.0227i
-0.0733 + 0.0433i -0.0687 + 0.0222i  0.2044 - 0.0362i
0.3671 + 0.4094i -0.3056 - 0.1696i  0.1402 - 0.1531i
-0.3045 - 0.1715i  0.3671 + 0.4094i -0.3056 - 0.1696i
0.1421 - 0.1514i -0.3045 - 0.1715i  0.3671 + 0.4094i
5.0449 + 0.0000i  0.6360 - 0.0020i -0.1402 + 0.0008i
0.6360 + 0.0020i  5.0449 + 0.0000i  0.6360 - 0.0020i
-0.1402 - 0.0008i  0.6360 + 0.0020i  5.0449 + 0.0000i
```

LAYER 2...

```
URC =
 1  0  0  0  0  0  0  0  0
 0  1  0  0  0  0  0  0  0
 0  0  1  0  0  0  0  0  0
 0  0  0  1  0  0  0  0  0
 0  0  0  0  1  0  0  0  0
 0  0  0  0  0  1  0  0  0
 0  0  0  0  0  0  1  0  0
 0  0  0  0  0  0  0  1  0
 0  0  0  0  0  0  0  0  1
```

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

```
ERC =
  6  0  0  0  0  0  0  0  0
  0  6  0  0  0  0  0  0  0
  0  0  6  0  0  0  0  0  0
  0  0  0  6  0  0  0  0  0
  0  0  0  0  6  0  0  0  0
  0  0  0  0  0  6  0  0  0
  0  0  0  0  0  0  6  0  0
  0  0  0  0  0  0  0  6  0
  0  0  0  0  0  0  0  0  6
```

===== STEP 4: WAVE VECTOR EXPANSION

```
I =
  1  0  0  0  0  0  0  0  0
  0  1  0  0  0  0  0  0  0
  0  0  1  0  0  0  0  0  0
  0  0  0  1  0  0  0  0  0
  0  0  0  0  1  0  0  0  0
  0  0  0  0  0  1  0  0  0
  0  0  0  0  0  0  1  0  0
  0  0  0  0  0  0  0  1  0
  0  0  0  0  0  0  0  0  1
```

```
Z =
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0
```

```
n1 = 1.4142
n2 = 3
k0 = 314.1593
kinc = [1.0607;0.61237;0.70711]
```

```
p = [-1  0  1]
q = [-1  0  1]
```

```
Kx =
  2.2035  0  0  0  0  0  0  0  0
  0  1.0607  0  0  0  0  0  0  0
  0  0  -0.0822  0  0  0  0  0  0
  0  0  0  2.2035  0  0  0  0  0
  0  0  0  0  1.0607  0  0  0  0
  0  0  0  0  0  -0.0822  0  0  0
  0  0  0  0  0  0  2.2035  0  0
  0  0  0  0  0  0  0  1.0607  0
  0  0  0  0  0  0  0  0  -0.0822
```

```
Ky =
  1.9457  0  0  0  0  0  0  0  0
  0  1.9457  0  0  0  0  0  0  0
  0  0  1.9457  0  0  0  0  0  0
  0  0  0  0.6124  0  0  0  0  0
  0  0  0  0  0.6124  0  0  0  0
  0  0  0  0  0  0.6124  0  0  0
  0  0  0  0  0  0  -0.7210  0  0
  0  0  0  0  0  0  0  -0.7210  0
  0  0  0  0  0  0  0  0  -0.7210
```

```
Kzref =
Columns 1 through 6
```

```
0.0000 + 2.5771i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 1.7061i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 1.3389i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 1.7974i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  -0.7071 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  -1.2721 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
```

```
Columns 7 through 9
```

```
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 1.8372i  0.0000 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  -0.5960 + 0.0000i  0.0000 + 0.0000i
0.0000 + 0.0000i  0.0000 + 0.0000i  -1.2139 + 0.0000i
```

```
Kztrn =
```

```
0.5989  0  0  0  0  0  0  0  0
  0  2.0222  0  0  0  0  0  0  0
  0  0  2.2820  0  0  0  0  0  0
  0  0  0  1.9415  0  0  0  0  0
  0  0  0  0  2.7386  0  0  0  0
  0  0  0  0  0  2.9357  0  0  0
  0  0  0  0  0  0  1.9039  0  0
  0  0  0  0  0  0  0  2.7121  0
  0  0  0  0  0  0  0  0  2.9109
```




RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

Table with 6 columns and 17 rows of complex numbers (e.g., 0.0000 + 0.0000i, -0.1557 + 0.0000i, etc.)

STEP 6: INITIALIZE GLOBAL S

SG.S11 = matrix of zeros (17x17)

SG.S12 = matrix with 1s on the diagonal (17x17)

SG.S21 = matrix with 1s on the diagonal (17x17)

SG.S22 = matrix of zeros (17x17)

STEP 7: MAIN LOOP

LAYER 1...
P =
Columns 1 through 6



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

Table with 8 columns of complex numbers (real and imaginary parts) representing spatial harmonics.

Columns 7 through 12

Table with 8 columns of complex numbers (real and imaginary parts) representing spatial harmonics.

Columns 13 through 18

Table with 8 columns of complex numbers (real and imaginary parts) representing spatial harmonics.

Q =

Columns 1 through 6

Table with 8 columns of real and imaginary components representing spatial harmonics.

Columns 7 through 12

Table with 8 columns of real and imaginary components representing spatial harmonics.

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)



Columns 13 through 18

0.3671 + 0.4094i	-0.3056 - 0.1696i	0.1402 - 0.1531i	0.2044 - 0.0362i	-0.0686 + 0.0227i	-0.0727 + 0.0443i
-0.3045 - 0.1715i	0.3671 + 0.4094i	-0.3056 - 0.1696i	-0.0687 + 0.0222i	0.2044 - 0.0362i	-0.0686 + 0.0227i
0.1421 - 0.1514i	-0.3045 - 0.1715i	0.3671 + 0.4094i	-0.0733 + 0.0433i	-0.0687 + 0.0222i	0.2044 - 0.0362i
0.1894 + 0.0000i	0.6360 - 0.0020i	-0.1402 + 0.0008i	0.3671 + 0.4094i	-0.3056 - 0.1696i	0.1402 - 0.1531i
0.6360 + 0.0020i	3.9199 + 0.0000i	0.6360 - 0.0020i	-0.3045 - 0.1715i	0.3671 + 0.4094i	-0.3056 - 0.1696i
-0.1402 - 0.0008i	0.6360 + 0.0020i	5.0381 + 0.0000i	0.1421 - 0.1514i	-0.3045 - 0.1715i	0.3671 + 0.4094i
0.3671 - 0.4094i	-0.3045 + 0.1715i	0.1421 + 0.1514i	0.1894 + 0.0000i	0.6360 - 0.0020i	-0.1402 + 0.0008i
-0.3056 + 0.1696i	0.3671 - 0.4094i	-0.3045 + 0.1715i	0.6360 + 0.0020i	3.9199 + 0.0000i	0.6360 - 0.0020i
0.1402 + 0.1531i	-0.3056 + 0.1696i	0.3671 - 0.4094i	-0.1402 - 0.0008i	0.6360 + 0.0020i	5.0381 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
-1.3494 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	-0.6495 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0503 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	1.5886 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.7647 + 0.0000i	0.0000 + 0.0000i
0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	-0.0593 + 0.0000i

OMEGA_SQ =

Columns 1 through 6

3.6919 + 0.0092i	-0.3024 + 0.0147i	-0.0771 - 0.0306i	-0.4452 - 0.4468i	0.1481 + 0.0399i	0.0702 + 0.0486i
-0.8283 - 0.0200i	-0.1341 + 0.0000i	-0.4435 + 0.0188i	0.4162 + 0.2365i	-0.3671 - 0.4094i	0.1934 + 0.1053i
0.1321 - 0.0004i	-0.6235 - 0.0014i	-1.2488 + 0.0003i	-0.1342 + 0.1476i	0.2986 + 0.1666i	-0.3700 - 0.4108i
-0.4510 + 0.4382i	0.1388 - 0.0447i	0.0878 - 0.0352i	0.3224 + 0.0000i	-0.2852 + 0.0009i	-0.1140 + 0.0007i
0.4285 - 0.2239i	-0.3671 + 0.4094i	0.1819 - 0.1165i	-0.8540 - 0.0026i	-3.5449 + 0.0000i	-0.4179 + 0.0013i
-0.1317 - 0.1487i	0.2993 - 0.1650i	-0.3702 + 0.4105i	0.1307 + 0.0008i	-0.6229 - 0.0019i	-4.6580 + 0.0000i
-0.1907 - 0.0579i	0.0111 - 0.0179i	-0.0274 + 0.0355i	-0.4452 + 0.4468i	0.1478 - 0.0408i	0.0696 - 0.0494i
0.0726 + 0.0484i	-0.2044 - 0.0362i	0.0645 - 0.0034i	0.4177 - 0.2340i	-0.3671 + 0.4094i	0.1927 - 0.1065i
0.0690 + 0.0440i	0.0664 + 0.0212i	-0.2039 - 0.0370i	-0.1323 - 0.1492i	0.2997 - 0.1648i	-0.3700 + 0.4108i
0.0844 + 0.0081i	0.2945 + 0.0112i	-0.1919 - 0.0263i	-0.0690 - 0.0330i	-0.1390 - 0.1146i	0.1858 - 0.0923i
-0.3529 - 0.0331i	0.0000 + 0.0000i	0.3531 + 0.0309i	0.2050 + 0.1192i	0.0000 - 0.0000i	-0.2058 - 0.1180i
0.1916 + 0.0286i	-0.2944 - 0.0131i	-0.0844 - 0.0081i	-0.1869 + 0.0900i	0.1383 + 0.1154i	0.0690 + 0.0330i
-0.0233 + 0.0080i	-0.0460 + 0.0353i	0.0639 + 0.0323i	0.0380 + 0.0000i	0.0975 - 0.0003i	-0.0706 + 0.0004i
0.0710 - 0.0313i	0.0000 + 0.0000i	-0.0708 + 0.0317i	-0.1259 - 0.0004i	0.0000 + 0.0000i	0.1259 - 0.0004i
-0.0635 - 0.0331i	0.0462 - 0.0350i	0.0233 - 0.0080i	0.0706 + 0.0004i	-0.0975 - 0.0003i	-0.0380 + 0.0000i
-0.0045 + 0.0071i	0.0188 + 0.0131i	0.0330 + 0.0026i	0.0256 - 0.0122i	0.0512 - 0.0428i	-0.0693 - 0.0333i
-0.0027 - 0.0175i	0.0000 + 0.0000i	0.0028 + 0.0174i	-0.0762 + 0.0437i	0.0000 + 0.0000i	0.0760 - 0.0442i
-0.0329 - 0.0030i	-0.0187 - 0.0132i	0.0045 - 0.0071i	0.0688 + 0.0342i	-0.0515 + 0.0425i	-0.0256 + 0.0122i

Columns 7 through 12

-0.1906 + 0.0579i	0.0113 + 0.0178i	-0.0279 - 0.0351i	0.0937 - 0.0018i	-0.0859 + 0.0195i	0.0274 - 0.0009i
0.0729 - 0.0479i	-0.2044 + 0.0362i	0.0645 + 0.0030i	-0.0401 - 0.0044i	0.0608 - 0.0055i	-0.0401 - 0.0041i
0.0695 - 0.0430i	0.0665 - 0.0207i	-0.2039 + 0.0370i	-0.0010 + 0.0000i	0.0032 - 0.0007i	-0.0035 + 0.0001i
-0.4510 - 0.4382i	0.1391 + 0.0438i	0.0882 + 0.0341i	-0.2523 + 0.3065i	0.2168 + 0.1974i	-0.1241 - 0.0617i
0.4271 + 0.2265i	-0.3671 - 0.4094i	0.1826 + 0.1154i	0.1137 - 0.0792i	-0.1319 + 0.1738i	0.1132 - 0.0799i
-0.1335 + 0.1470i	0.2983 + 0.1668i	-0.3702 - 0.4105i	0.0046 + 0.0024i	-0.0081 + 0.0073i	0.0094 - 0.0114i
0.4259 - 0.0092i	-0.3025 - 0.0128i	-0.0767 + 0.0315i	-0.2465 - 0.1104i	0.1047 + 0.1106i	0.1058 + 0.0105i
-0.8285 + 0.0149i	-3.4001 + 0.0000i	-0.4436 - 0.0161i	0.0405 + 0.0477i	-0.1292 - 0.0760i	0.0408 + 0.0474i
0.1321 + 0.0019i	-0.6235 - 0.0024i	-4.5148 - 0.0003i	-0.0039 - 0.0004i	-0.0039 - 0.0041i	0.0092 + 0.0041i
0.0121 + 0.0191i	-0.0506 + 0.0357i	-0.0888 + 0.0081i	3.6791 - 0.0016i	-0.7118 + 0.0192i	0.1644 - 0.0016i
0.0077 - 0.0470i	0.0000 - 0.0000i	-0.0074 + 0.0471i	-0.7095 - 0.0100i	-0.0226 - 0.0101i	-0.7095 - 0.0056i
0.0889 - 0.0069i	0.0508 - 0.0354i	-0.0121 - 0.0191i	0.1644 + 0.0003i	-0.7119 + 0.0148i	-1.1697 - 0.0016i
-0.0233 + 0.0080i	-0.0462 - 0.0350i	0.0635 - 0.0331i	-0.4372 + 0.4946i	0.3647 + 0.2264i	-0.1766 - 0.1685i
0.0708 + 0.0317i	0.0000 + 0.0000i	-0.0710 - 0.0313i	0.3712 - 0.2154i	-0.4433 + 0.5097i	0.3698 - 0.2176i
-0.0639 + 0.0323i	0.0460 + 0.0353i	0.0233 + 0.0080i	-0.1744 - 0.1707i	0.3661 - 0.2241i	-0.4372 + 0.4946i
-0.0313 + 0.0030i	-0.1091 + 0.0048i	0.0710 - 0.0106i	-0.1237 - 0.0001i	0.0344 - 0.0139i	0.0387 + 0.0399i
0.1308 - 0.0115i	0.0000 + 0.0000i	-0.1308 + 0.0123i	0.0410 - 0.0097i	-0.1165 + 0.0154i	0.0410 - 0.0100i
-0.0711 + 0.0097i	0.1091 - 0.0042i	0.0313 - 0.0030i	0.0382 + 0.0404i	0.0345 - 0.0137i	-0.1237 - 0.0001i

Columns 13 through 18

0.2591 + 0.2332i	-0.2288 - 0.1275i	0.1280 - 0.0677i	0.2465 - 0.1104i	-0.1041 + 0.1112i	-0.1057 + 0.0119i
-0.1171 - 0.0516i	0.1375 + 0.1223i	-0.1174 - 0.0509i	-0.0408 + 0.0474i	0.1292 - 0.0760i	-0.0405 + 0.0477i
-0.0048 + 0.0025i	0.0085 + 0.0048i	-0.0097 - 0.0087i	0.0039 - 0.0004i	0.0039 - 0.0041i	-0.0092 + 0.0041i
0.0000 + 0.0121i	0.0000 + 0.0136i	0.0001 + 0.0100i	0.2523 + 0.3065i	-0.2180 - 0.1961i	0.1233 - 0.0632i
0.0000 - 0.0158i	0.0000 + 0.0028i	-0.0000 - 0.0158i	-0.1132 - 0.0799i	0.1319 + 0.1738i	-0.1137 - 0.0792i
0.0000 - 0.0004i	0.0000 - 0.0005i	0.0000 - 0.0005i	-0.0046 + 0.0023i	0.0081 + 0.0074i	-0.0094 - 0.0114i
-0.2591 + 0.2332i	0.2280 - 0.1289i	-0.1289 - 0.0661i	-0.0937 - 0.0018i	0.0860 + 0.0190i	-0.0274 - 0.0006i
0.1174 - 0.0509i	-0.1375 + 0.1223i	0.1171 - 0.0516i	0.0401 - 0.0041i	-0.0608 - 0.0055i	0.0401 - 0.0044i
0.0048 + 0.0025i	-0.0085 + 0.0048i	0.0097 - 0.0087i	0.0010 + 0.0000i	-0.0032 - 0.0007i	0.0035 + 0.0001i
-0.1383 - 0.2035i	0.1035 + 0.0570i	-0.0271 + 0.0933i	0.0133 - 0.0613i	-0.0233 + 0.0755i	-0.0206 - 0.0338i
0.0897 + 0.0768i	-0.1148 - 0.1850i	0.0902 + 0.0763i	-0.0061 + 0.0647i	0.0327 - 0.1031i	-0.0057 + 0.0648i
-0.0283 + 0.0930i	0.1031 + 0.0577i	-0.1383 - 0.2035i	-0.0202 - 0.0340i	-0.0238 + 0.0754i	0.0133 - 0.0613i
0.1856 + 0.0034i	-0.6359 + 0.0057i	0.1402 + 0.0019i	-0.2970 - 0.3242i	0.2450 + 0.1152i	-0.1059 + 0.1355i
-0.6359 - 0.0111i	-3.5449 + 0.0016i	-0.6360 - 0.0072i	0.2391 + 0.1254i	-0.2909 - 0.3091i	0.2399 + 0.1239i
0.1402 + 0.0036i	-0.6360 + 0.0018i	-4.6631 + 0.0034i	-0.1076 + 0.1342i	0.2442 + 0.1167i	-0.2970 - 0.3242i
-0.2823 + 0.3331i	0.2299 - 0.1293i	-0.0999 - 0.1297i	0.3610 + 0.0006i	-0.6641 - 0.0042i	0.1492 - 0.0006i
0.2258 - 0.1350i	-0.2736 + 0.3263i	0.2249 - 0.1364i	-0.6632 + 0.0008i	-3.3588 + 0.0037i	-0.6632 + 0.0050i
-0.0983 - 0.1310i	0.2307 - 0.1279i	-0.2823 + 0.3331i	0.1492 + 0.0011i	-0.6640 - 0.0084i	-4.4877 + 0.0006i

W =

Columns 1 through 6

0.7230 + 0.0000i	0.6926 + 0.0000i	0.0210 - 0.1266i	-0.0180 + 0.1339i	0.0890 - 0.0022i	0.0976 - 0.0103i
-0.1947 - 0.0003i	-0.1635 - 0.0038i	-0.0588 - 0.2240i	0.0704 + 0.0402i	0.7853 + 0.0000i	0.7458 + 0.0000i
0.0480 - 0.0082i	0.0432 + 0.0010i	0.0927 + 0.0819i	-0.0200 - 0.0036i	-0.4240 - 0.0005i	-0.3945 + 0.0208i
-0.1503 + 0.1686i	-0.0412 + 0.0310i	-0.3789 - 0.3261i	0.0578 + 0.0384i	0.1070 - 0.0090i	0.1247 - 0.0515i
0.0829 - 0.0742i	0.0439 - 0.0253i	0.1862 + 0.1122i	-0.0033 + 0.0158i	-0.1048 + 0.1017i	-0.1179 + 0.1139i
-0.0251 + 0.0038i	-0.0235 - 0.0053i	-0.0832 - 0.0184i	-0.0008 - 0.0005i	0.0982 - 0.0771i	0.0910 - 0.0921i
-0.0779 - 0.0947i	0.0091 + 0.0216i	0.6686 + 0.0000i	0.3117 + 0.0069i	-0.0209 - 0.2181i	-0.0650 + 0.0851i
0.0227 + 0.0494i	0.0044 + 0.0014i	-0.2129 + 0.0152i	-0.0748 - 0.0058i	-0.0454 + 0.0035i	-0.0206 - 0.0619i
0.0078 - 0.0072i	0.0072 + 0.0007i	0.0577 + 0.0044i	0.0159 + 0.0016i	0.0280 + 0.0225i	0.0221 + 0.0409i
0.5348 - 0.0265i	-0.6744 - 0.0269i	-0.0162 - 0.0149i	-0.0144 - 0.0574i	-0.0941 - 0.0395i	-0.1710 - 0.0100i
-0.1896 + 0.0025i	0.0683 + 0.0032i	-0.0643 - 0.1096i	-0.0104 - 0.0523i	0.0073 - 0.1621i	-0.2914 - 0.0345i
0.0869 - 0.0083i	0.0066 + 0.0035i	0.1039 + 0.0760i	0.0188 + 0.0019i	-0.1770 + 0.0744i	-0.0120 + 0.0189i
-0.0911 + 0.0916i	0.0998 - 0.1033i	-0.1495 - 0.1186i	-0.4226 - 0.3942i	-0.0523 - 0.0058i	-0.1247 + 0.0622i
0.0592 - 0.0483i	-0.0423 + 0.0295i	0.0819 + 0.0348i	0.1228 + 0.0930i	0.0095 + 0.0263i	0.0322 - 0.0315i



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

-0.0358 + 0.0063i 0.0135 + 0.0072i -0.0573 - 0.0050i -0.0526 - 0.0102i 0.0135 - 0.0412i -0.0189 + 0.0020i
-0.0188 - 0.0181i 0.0244 + 0.0242i 0.1794 - 0.0228i 0.6877 + 0.0000i -0.1035 - 0.0773i -0.1316 + 0.2057i
0.0043 + 0.0043i -0.0046 - 0.0112i -0.0192 + 0.0121i -0.1560 - 0.0052i 0.0050 + 0.0057i 0.0217 - 0.0237i
0.0009 + 0.0016i -0.0092 - 0.0005i -0.0061 - 0.0053i 0.0414 + 0.0158i 0.0014 - 0.0004i -0.0058 + 0.0011i

Columns 7 through 12

-0.0656 - 0.0439i 0.0502 + 0.0340i 0.0292 + 0.0021i 0.0038 - 0.0072i -0.0061 - 0.0057i -0.0035 + 0.0015i
0.2615 + 0.1063i -0.2645 - 0.0745i 0.3908 + 0.0000i -0.0072 + 0.0083i -0.0195 + 0.0043i 0.0100 - 0.0040i
-0.1555 - 0.1197i 0.1962 + 0.1067i 0.8709 + 0.0000i -0.0334 + 0.0388i 0.0725 + 0.0449i -0.0041 + 0.0202i
-0.2101 - 0.0018i 0.6247 + 0.0000i -0.0277 + 0.0158i 0.0008 + 0.0620i 0.0080 + 0.0079i 0.0082 + 0.0103i
0.0049 + 0.0194i 0.0122 - 0.0737i 0.0637 - 0.0282i 0.0132 - 0.0270i 0.1425 + 0.0284i 0.0248 + 0.0148i
0.0331 - 0.0008i -0.0406 + 0.0637i -0.0799 + 0.1089i -0.0049 + 0.0023i 0.7531 + 0.0000i 0.0482 + 0.1535i
0.1587 - 0.1354i 0.4511 - 0.3332i -0.0003 + 0.0074i -0.0517 + 0.0228i -0.0083 - 0.0057i 0.0058 + 0.0132i
-0.0558 + 0.0192i 0.0145 + 0.0946i -0.0005 + 0.0486i 0.0192 + 0.0448i 0.0337 - 0.1035i -0.0202 + 0.0232i
0.0280 + 0.0139i -0.0237 - 0.0702i -0.0457 - 0.0449i 0.0015 - 0.0161i 0.3673 - 0.4736i 0.0728 + 0.0925i
-0.0180 + 0.0238i 0.0043 + 0.0150i -0.0163 - 0.0013i 0.0333 + 0.0035i -0.0051 + 0.0069i -0.0023 - 0.0117i
-0.0980 - 0.0390i -0.1868 - 0.0309i -0.2099 + 0.0023i 0.4599 - 0.0165i 0.0199 + 0.0059i -0.0093 + 0.0043i
-0.0007 + 0.0156i 0.1734 + 0.1073i 0.0612 + 0.0120i 0.8480 + 0.0000i -0.0159 - 0.0021i 0.0232 + 0.0360i
0.6964 + 0.0000i 0.2131 + 0.0195i 0.0189 - 0.0602i 0.0279 + 0.1020i 0.0036 + 0.0047i -0.0063 - 0.0060i
-0.0544 - 0.0317i 0.0180 - 0.0382i 0.0177 - 0.0333i 0.0848 - 0.0646i -0.0243 + 0.0203i 0.2428 + 0.0239i
0.0153 + 0.0337i -0.0408 + 0.0391i -0.0237 + 0.0255i -0.0876 + 0.1267i -0.0148 + 0.1379i 0.7604 + 0.0000i
0.3896 - 0.3519i 0.0944 - 0.0495i -0.0203 + 0.0030i -0.0145 + 0.0388i 0.0013 + 0.0085i -0.0014 + 0.0186i
-0.0027 + 0.0425i 0.0122 + 0.0151i 0.0317 + 0.0212i 0.0091 + 0.0596i 0.0178 - 0.0051i 0.0466 - 0.1453i
-0.0186 - 0.0408i -0.0051 - 0.0077i -0.0196 - 0.0137i -0.0292 - 0.0452i 0.0878 + 0.0591i 0.2790 - 0.4650i

Columns 13 through 18

0.0131 + 0.0120i 0.0121 - 0.0068i -0.0093 + 0.0038i 0.0220 + 0.0007i 0.0105 - 0.0069i -0.0091 - 0.0154i
0.0037 - 0.0142i 0.0014 - 0.0021i 0.0820 + 0.0478i -0.0528 - 0.0043i 0.0207 - 0.1222i 0.0031 + 0.0592i
0.0742 - 0.0662i 0.0009 + 0.0158i -0.0722 - 0.0475i 0.0075 + 0.0144i -0.0156 + 0.1707i -0.0914 + 0.0618i
-0.0342 - 0.0156i 0.0044 + 0.0213i 0.0290 + 0.0052i 0.0283 - 0.0109i -0.0632 - 0.0007i 0.0385 - 0.0010i
-0.2587 - 0.1438i 0.0802 + 0.0011i 0.7188 + 0.0000i -0.0588 + 0.0837i -0.3947 - 0.2673i 0.0531 - 0.1470i
-0.2627 + 0.4367i 0.1024 + 0.0133i -0.1558 - 0.0945i 0.1298 - 0.0166i 0.2307 + 0.1599i -0.0011 + 0.1295i
0.0346 + 0.0084i 0.0075 - 0.0045i 0.0149 - 0.0198i -0.0452 + 0.0184i 0.0447 + 0.0182i 0.0316 + 0.0403i
0.2764 + 0.1139i -0.0491 + 0.0510i 0.5275 - 0.3230i 0.0326 + 0.0628i 0.5709 + 0.0000i 0.2126 + 0.2032i
0.6718 + 0.0000i -0.1064 + 0.1150i -0.0087 + 0.1298i -0.1336 + 0.0843i -0.3605 - 0.0049i -0.0972 - 0.1338i
0.0178 - 0.0062i -0.0024 + 0.0088i 0.0156 + 0.0026i -0.0127 + 0.0051i -0.0126 - 0.0003i 0.0063 - 0.0167i
-0.0029 - 0.0147i 0.0052 - 0.0051i -0.0088 - 0.0002i 0.0299 + 0.0482i 0.0105 + 0.0251i 0.0006 - 0.0052i
0.0069 + 0.0180i 0.0165 - 0.0174i -0.0254 - 0.0182i -0.0376 - 0.0498i -0.0331 + 0.0401i -0.0159 + 0.0558i
0.0073 + 0.0063i -0.0223 - 0.0472i -0.0077 + 0.0074i 0.0938 + 0.0071i 0.0930 - 0.0200i -0.1305 - 0.0450i
0.1212 + 0.0494i -0.2433 - 0.2360i 0.0205 + 0.1110i 0.7270 + 0.0000i 0.2340 - 0.0311i -0.3290 - 0.3179i
0.0541 - 0.0938i -0.2034 - 0.4402i -0.0127 - 0.0477i -0.2179 - 0.0440i -0.1193 + 0.0416i 0.2038 + 0.2024i
0.0226 + 0.0024i 0.0446 + 0.0019i 0.0167 - 0.0023i 0.0367 - 0.0550i 0.0036 + 0.0568i 0.1756 + 0.0487i
0.2043 + 0.0752i 0.3376 + 0.0859i 0.1096 + 0.0586i 0.4251 - 0.3712i -0.0863 + 0.2413i 0.6025 + 0.0000i
0.0898 + 0.1137i 0.6896 + 0.0000i -0.0051 - 0.0132i -0.0570 + 0.1240i 0.1073 - 0.1483i -0.3375 + 0.0108i

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Columns 13 through 18

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0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i

RCWA Benchmark Data
 3x3 Spatial Harmonics (oblique incidence)

```

0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 2.1278i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 - 2.1597i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 2.0124i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 - 1.9606i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 - 1.6532i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 1.6622i

```

V =
Columns 1 through 6

```

1.4812 + 0.0011i 1.5303 + 0.0004i 0.0326 - 0.7127i 0.0350 + 0.1455i 0.7249 - 0.3829i 0.1827 - 0.0828i
-0.3250 - 0.0062i -0.2947 - 0.0059i -0.2577 - 0.6804i 0.1101 + 0.1549i 3.0859 - 1.1952i 0.7176 - 0.2846i
0.0979 - 0.0082i 0.0913 + 0.0004i 0.3572 + 0.2491i -0.0957 - 0.0548i -1.6220 + 0.5540i -0.3724 + 0.1514i
0.0396 - 0.0266i -0.1139 + 0.1754i -0.3457 - 0.3050i 0.3859 + 0.3534i 0.1464 - 0.0122i 0.0919 - 0.0468i
-0.0226 + 0.0154i 0.0878 - 0.0565i 0.1271 + 0.0831i -0.1165 - 0.0779i -0.0528 + 0.1355i -0.0268 + 0.0482i
0.0151 - 0.0030i -0.0392 - 0.0144i -0.0697 - 0.0158i 0.0525 + 0.0077i 0.0706 - 0.1100i 0.0256 - 0.0343i
0.1139 + 0.1278i -0.0769 - 0.0824i -1.1133 + 0.0104i -0.8690 - 0.0142i -0.0206 + 0.7204i 0.1005 - 0.0494i
-0.0350 - 0.0714i 0.0132 + 0.0341i 0.2933 - 0.0290i 0.2094 + 0.0149i 0.1048 - 0.0949i -0.0014 + 0.0057i
-0.0229 + 0.0187i 0.0195 - 0.0002i -0.0945 - 0.0000i -0.0614 - 0.0251i -0.0781 + 0.0101i -0.0097 - 0.0032i
-1.4429 + 0.0588i 1.1139 + 0.0592i 0.0051 + 0.6902i -0.0412 + 0.0295i -0.7270 + 0.4541i -0.0574 + 0.0943i
-0.0056 + 0.0001i -0.2317 - 0.0075i 0.1152 + 0.1959i 0.0142 - 0.0174i -1.3066 + 0.6940i 0.0731 + 0.1648i
0.1074 - 0.0175i 0.0888 + 0.0024i 0.1185 + 0.1012i -0.0228 - 0.0057i -0.2760 + 0.0247i -0.2185 + 0.0175i
0.2122 - 0.2260i -0.1424 + 0.1558i 1.4134 + 1.2048i 0.1525 + 0.1506i -0.3851 + 0.0497i -0.0363 + 0.0272i
-0.0000 - 0.0076i 0.0770 - 0.0513i -0.1729 - 0.0887i -0.0092 - 0.0069i 0.0332 - 0.2077i -0.0426 + 0.0029i
-0.0578 + 0.0089i -0.0477 - 0.0104i -0.1062 - 0.0225i -0.0007 - 0.0008i 0.0575 - 0.0545i 0.0489 - 0.0517i
0.0774 + 0.0907i -0.0715 - 0.0646i -2.1059 - 0.0426i -0.2994 - 0.0367i -0.2252 + 1.9835i 0.0674 + 0.2155i
0.0066 + 0.0063i 0.0148 + 0.0207i 0.1744 - 0.0075i 0.0109 + 0.0088i 0.1359 - 0.1339i 0.0038 - 0.0413i
0.0180 - 0.0169i 0.0139 + 0.0015i 0.0730 + 0.0053i 0.0179 + 0.0027i 0.0223 + 0.0097i 0.0128 + 0.0213i

```

Columns 7 through 12

```

0.0201 + 0.0084i -0.3516 + 0.2418i -0.0083 - 0.0030i -0.0418 + 0.1104i -0.0024 + 0.0033i 0.0468 + 0.0055i
-0.0696 + 0.2033i 0.3967 - 1.9374i -0.0214 + 0.0323i 0.0688 + 2.0132i 0.0059 + 0.0135i -0.0050 - 0.0699i
0.0763 - 0.0997i -0.7900 + 1.1525i -0.0449 - 0.0039i 0.0048 + 3.6299i -0.0161 - 0.0479i -0.1533 + 0.1576i
0.0023 - 0.3049i -0.0162 + 1.6825i 0.0444 + 0.0211i -0.1879 + 0.0363i -0.0025 + 0.0009i 0.0152 - 0.0119i
-0.0174 + 0.0203i 0.1452 - 0.0110i 0.0413 + 0.0251i 0.1095 + 0.1528i -0.0644 - 0.0005i -0.0679 + 0.5932i
0.0160 + 0.0007i -0.1348 - 0.0780i -0.0246 - 0.0237i -0.2313 - 0.1579i -0.3371 - 0.0616i 0.0043 + 1.8732i
-0.1998 - 0.2245i -0.7491 - 0.9962i 0.0105 + 0.0019i -0.0297 + 0.0062i -0.0034 - 0.0022i -0.0435 + 0.0031i
0.0235 + 0.0091i 0.1385 - 0.0403i -0.0174 + 0.0455i -0.0409 + 0.0089i -0.0332 + 0.0369i 0.3655 + 0.1059i
-0.0188 + 0.0049i -0.1439 + 0.0653i 0.0182 - 0.0314i 0.0339 - 0.0056i -0.1356 + 0.2299i 1.1863 + 0.7222i
0.0086 - 0.0295i 0.4086 - 0.3016i 0.0137 - 0.0528i 0.0336 - 0.0833i -0.0285 - 0.0030i -0.0194 - 0.0042i
-0.0186 + 0.0286i -0.2516 + 1.1557i 0.0102 - 0.6145i -0.0163 - 0.7810i -0.0008 + 0.0621i -0.0116 + 0.0039i
0.0559 - 0.0731i 0.0348 - 0.0760i -0.0013 - 1.0321i 0.0478 + 0.1503i 0.1019 - 0.1666i 0.0430 + 0.0138i
-0.0073 - 0.1058i 0.0154 - 5.9670i 0.1146 + 0.0373i 0.3017 - 0.0083i -0.0120 + 0.0079i 0.0178 - 0.0277i
-0.0028 + 0.0088i -0.2561 + 0.0307i -0.0365 - 0.0825i -0.0854 - 0.1006i 0.0960 - 0.4216i 0.0570 - 0.1262i
0.0005 + 0.0157i 0.0241 + 0.0178i 0.1293 + 0.0950i -0.0074 - 0.0007i -0.0029 - 1.7279i 0.3502 - 0.0908i
-0.0744 - 0.0885i -2.5862 - 3.4978i 0.0515 + 0.0794i 0.0827 + 0.1366i 0.0362 + 0.0033i 0.0265 + 0.0063i
-0.0016 - 0.0130i 0.2753 - 0.0792i 0.0686 + 0.0124i 0.1023 - 0.0268i -0.3031 - 0.0827i 0.1038 + 0.0456i
-0.0061 + 0.0128i -0.0261 + 0.0067i -0.0533 + 0.0549i -0.0172 - 0.0052i -1.0843 - 0.8443i 0.1963 - 0.1757i

```

Columns 13 through 18

```

-0.0087 + 0.0006i -0.0273 - 0.0297i -0.0125 + 0.0228i 0.0013 - 0.0653i -0.0083 + 0.0069i 0.0007 - 0.0373i
0.0035 - 0.0172i 0.0033 + 0.0219i 0.0806 - 0.0566i -0.1964 + 0.1775i -0.0091 + 0.0914i -0.1292 - 0.0897i
0.0304 - 0.0260i 0.1162 + 0.1519i -0.0723 + 0.0536i 0.2033 - 0.2383i -0.0322 - 0.1624i 0.3770 + 0.1076i
-0.0107 - 0.0086i 0.1073 - 0.0435i 0.0203 - 0.0210i -0.0195 + 0.1965i 0.0635 + 0.0680i -0.1205 + 0.2473i
0.0459 - 0.1686i 0.5502 - 0.5482i 0.2411 - 0.2715i -0.0316 + 1.5872i 0.1417 + 0.2938i -0.6029 + 0.5613i
-0.1846 - 0.1500i 1.0096 - 0.4689i -0.1029 + 0.0360i 0.0945 - 0.4985i -0.0868 - 0.1845i 0.3532 - 0.3477i
0.0082 - 0.0247i 0.0032 + 0.1094i 0.0202 - 0.0175i 0.1236 + 0.0739i -0.0873 - 0.1219i 0.0438 - 0.3041i
0.1328 - 0.3387i -0.1944 + 0.8308i 0.2529 - 0.0489i 0.8934 + 0.9928i -0.4674 - 0.3765i -0.0825 - 1.0816i
0.2707 - 0.2603i -0.0005 + 1.6409i -0.0343 + 0.0076i -0.3054 - 0.1750i 0.2853 + 0.2292i 0.0354 + 0.6338i
-0.0305 - 0.0157i -0.0053 + 0.0015i 0.0124 - 0.0801i -0.0114 + 0.0025i -0.0016 - 0.0487i -0.0066 + 0.0153i
0.0113 + 0.0206i -0.0003 - 0.0088i -0.1404 + 0.2056i 0.0471 + 0.0387i -0.2197 - 0.0746i -0.0326 + 0.0535i
0.1404 + 0.1575i 0.0374 + 0.0029i 0.0941 - 0.1453i 0.0328 - 0.0217i 0.2836 + 0.0212i -0.0908 - 0.1485i
0.1201 - 0.0975i 0.0263 - 0.0266i -0.0301 + 0.1900i -0.0015 - 0.1011i -0.1109 + 0.4131i 0.1659 - 0.0453i
0.4085 - 0.7052i -0.0678 - 0.1337i -0.0307 + 1.8454i 0.2189 - 0.1650i -0.5981 - 0.8137i 0.3734 + 0.0633i
0.9313 - 0.5637i 0.0366 - 0.2252i 0.1892 - 0.3122i -0.0313 - 0.2641i 0.2619 - 0.3796i -0.2131 - 0.0030i
-0.0084 + 0.1452i 0.0129 + 0.0239i 0.1155 + 0.0793i 0.0845 + 0.0943i 0.0504 - 0.4647i -0.1807 + 0.0155i
-0.2825 + 0.7294i 0.0970 + 0.2554i 0.8485 + 1.3143i 0.3668 + 0.1704i -0.1008 - 1.2877i -0.4590 + 0.2356i
-0.0033 + 1.4374i 0.2485 + 0.2126i -0.2604 - 0.0172i 0.1724 + 0.2692i -0.0127 + 0.5901i 0.2203 - 0.1699i

```

A =

Columns 1 through 6

```

0.7847 + 0.0508i 0.0417 - 0.0015i -0.0995 - 0.0162i -0.1614 - 0.1714i 0.0649 + 0.0520i 0.0281 + 0.0135i
1.4839 - 0.0524i -0.2769 + 0.0084i 0.0838 - 0.0023i -0.1015 - 0.1112i 0.0400 + 0.0291i -0.0272 - 0.0047i
-0.0200 + 0.2271i -0.0386 - 0.0020i -0.1098 + 0.0950i -0.6309 + 0.5359i 0.1601 - 0.0853i 0.0467 + 0.0155i
-0.0408 - 0.2798i 0.1370 - 0.1035i -0.0599 + 0.0126i 0.4550 - 0.4388i -0.1315 + 0.1173i -0.0005 + 0.0039i
0.2581 + 0.2696i 0.1093 + 0.4535i 0.5252 + 0.0163i 0.2014 + 0.0295i -0.0615 - 0.1690i 0.0006 - 0.0692i
0.7225 - 0.2343i 3.3681 - 0.4738i -2.0694 - 0.1271i 0.0179 - 0.0049i 0.0757 + 0.1624i -0.0578 + 0.2956i
0.1207 + 0.1096i -0.3778 - 1.1420i 0.2917 + 0.7360i -0.2482 + 0.9005i -0.0074 - 0.1130i 0.0958 + 0.0077i
0.0417 - 0.0487i -0.1640 + 0.0099i 0.0353 + 0.0412i 0.7948 - 0.0460i 0.0093 + 0.0305i 0.0016 + 0.0032i
0.0482 + 0.0347i 0.5177 + 0.6423i 0.8739 + 1.2340i -0.0023 - 0.1003i 0.1167 - 0.0305i -0.0279 - 0.0376i
0.0171 - 0.0197i 0.1958 - 0.1146i -0.0207 - 0.0054i -0.0187 - 0.0774i 0.0444 - 0.0010i 0.0002 + 0.0003i
-0.0058 + 0.0130i -0.0268 - 0.0204i 0.1041 + 0.0076i -0.0058 + 0.0031i 0.1630 - 0.0861i 0.4868 - 0.0026i
0.0096 + 0.0078i -0.0056 + 0.0142i 0.0094 - 0.0191i 0.0115 - 0.0065i 0.0366 - 0.1213i 0.0406 - 0.0916i
-0.0169 - 0.0073i 0.0114 + 0.0014i 0.1204 + 0.0073i -0.0444 + 0.0518i -0.3561 + 0.1317i -0.3511 + 0.5758i
-0.0094 + 0.0091i 0.0048 - 0.0013i 0.0093 - 0.0146i 0.0217 - 0.0055i 0.1486 + 0.0937i 0.0556 + 0.0009i
-0.0319 + 0.0184i 0.0551 - 0.1059i -0.0257 + 0.0867i 0.0785 - 0.0105i 0.7780 + 0.2491i -0.1739 + 0.1044i
-0.0043 + 0.0236i -0.0422 - 0.0678i 0.0182 - 0.0106i 0.0442 - 0.0305i 0.0404 - 0.3704i 0.0652 + 0.0093i
0.0209 + 0.0157i -0.0614 + 0.1181i 0.1326 - 0.1552i -0.1984 + 0.0343i -0.2724 + 0.3633i 0.0936 - 0.0682i
0.0027 + 0.0069i -0.0196 - 0.0202i -0.1424 + 0.0350i -0.0417 + 0.0510i -0.1988 + 0.0654i -0.0094 - 0.1680i

```

Columns 7 through 12

```

-0.0412 + 0.0502i 0.0015 - 0.0097i -0.0067 - 0.0114i 0.9437 - 0.0194i -0.2624 + 0.0034i 0.0737 + 0.0063i
-0.0286 + 0.0266i 0.0041 - 0.0047i 0.0075 + 0.0014i -1.8408 + 0.0197i 0.2438 - 0.0052i -0.0473 + 0.0012i
0.8235 - 0.0232i -0.1100 - 0.0020i -0.0293 - 0.0133i 0.0341 + 0.3446i -0.1222 + 0.3519i 0.1590 - 0.1111i
0.1671 + 0.0423i -0.1026 - 0.0080i 0.0225 + 0.0132i -0.0300 + 0.4783i -0.2033 + 0.2209i 0.0912 - 0.0588i
0.1571 + 1.0374i -0.0882 - 0.0686i -0.0200 - 0.0052i 0.5222 + 0.1740i 2.0513 + 0.6225i -0.8860 - 0.3143i
-0.0414 - 0.8308i 0.0867 + 0.0634i 0.0976 - 0.0150i -1.3508 - 0.2004i -3.5722 - 0.6663i 0.8062 + 0.3789i
0.3449 - 0.7795i -0.0982 - 0.0755i 0.0718 - 0.0285i -0.2562 - 0.2262i -0.2101 + 0.8140i 0.2812 - 0.1443i

```



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

Table with 18 columns of numerical values, representing the first set of benchmark data.

Columns 13 through 18

Table with 18 columns of numerical values, representing the second set of benchmark data.

B =

Columns 1 through 6

Table with 18 columns of numerical values, representing the third set of benchmark data.

Columns 7 through 12

Table with 18 columns of numerical values, representing the fourth set of benchmark data.

Columns 13 through 18

Table with 18 columns of numerical values, representing the fifth set of benchmark data.

X =

Columns 1 through 6

Table with 18 columns of numerical values, representing the final set of benchmark data.

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

-0.0599 - 0.0479i	0.0184 + 0.0173i	0.0045 + 0.0140i	-0.0298 - 0.0045i	0.0070 - 0.0016i	0.0024 - 0.0101i
0.2259 + 0.2340i	-0.0869 + 0.0219i	0.0729 - 0.0941i	-0.0256 + 0.0522i	-0.0092 - 0.0456i	-0.0444 - 0.0849i
0.4389 + 0.5792i	-0.3846 - 0.0713i	0.1454 - 0.1953i	-0.1292 + 0.1121i	0.0827 - 0.1675i	-0.1727 - 0.2085i
-0.3602 - 0.0269i	0.0059 + 0.0076i	-0.0278 - 0.0050i	-0.0431 - 0.0551i	0.0148 + 0.0182i	-0.0240 + 0.0283i
0.0116 + 0.0390i	0.1062 + 0.0428i	-0.1781 + 0.0499i	0.0574 + 0.0458i	-0.0113 - 0.0690i	0.0185 + 0.0165i
-0.1213 + 0.0251i	0.0094 - 0.0624i	0.0320 + 0.0524i	-0.0374 - 0.0351i	-0.0080 + 0.0141i	0.0275 + 0.0086i
0.0732 - 0.0412i	-0.0155 - 0.0009i	0.0263 - 0.0126i	0.4128 + 0.0027i	-0.0325 - 0.0180i	0.0285 + 0.0132i
-0.0716 + 0.0315i	0.0358 - 0.0429i	-0.0730 + 0.0127i	-0.0079 - 0.0013i	-0.2718 - 0.0553i	0.2640 - 0.0220i
-0.0018 - 0.0383i	0.0157 - 0.0064i	-0.0188 + 0.0024i	0.0403 - 0.0007i	0.0672 + 0.0632i	-0.0134 - 0.0326i
-0.0151 - 0.0072i	0.0153 + 0.0088i	-0.0106 + 0.0040i	-0.0080 + 0.0058i	0.0015 - 0.0019i	0.0065 + 0.0041i
-0.1063 - 0.1562i	0.0824 + 0.0123i	-0.0381 + 0.0452i	0.0466 - 0.0392i	-0.0284 + 0.0484i	0.0611 + 0.0402i
0.0082 + 0.0558i	-0.0611 - 0.0396i	0.0544 + 0.0743i	-0.0211 + 0.0114i	0.0160 - 0.0393i	0.0026 + 0.0205i
0.4917 - 0.0208i	0.0033 + 0.0237i	-0.0058 + 0.0213i	0.1201 + 0.1171i	-0.0347 - 0.0132i	-0.0358 - 0.0365i
-0.0073 - 0.0188i	-0.1043 - 0.0151i	0.1367 + 0.0321i	0.0383 + 0.0257i	0.0918 + 0.1850i	-0.0834 - 0.1238i
0.0176 + 0.0027i	-0.0177 - 0.1672i	-0.0873 - 0.2102i	-0.0643 + 0.0054i	-0.0246 + 0.0280i	0.0190 - 0.0640i
0.0978 - 0.1198i	-0.0097 + 0.0184i	0.0057 - 0.0025i	0.3548 - 0.0063i	0.0037 + 0.0049i	-0.0171 + 0.0386i
0.0535 + 0.0151i	0.0708 - 0.0766i	-0.0830 + 0.0320i	-0.0589 + 0.0022i	-0.0521 - 0.0044i	0.0400 + 0.0638i
-0.0168 - 0.0467i	0.0199 + 0.0731i	-0.0626 + 0.0124i	0.0533 - 0.0193i	-0.0263 - 0.1762i	-0.0354 - 0.1136i

S.S12 =
Columns 1 through 6

0.0420 - 0.0020i	0.1047 - 0.0213i	0.2271 - 0.0454i	0.0148 + 0.0075i	0.0179 - 0.0023i	0.0216 - 0.0159i
0.1218 - 0.0066i	1.5861 - 0.1963i	3.0145 - 0.4969i	-0.0624 - 0.1215i	-0.1892 - 0.1668i	0.1514 - 0.1432i
0.2411 - 0.0481i	4.2182 - 0.7145i	10.0658 - 1.8093i	-0.0860 - 0.2993i	-0.5276 - 0.2758i	0.4757 - 0.6314i
-0.0027 - 0.0078i	-0.1228 - 0.0916i	-0.3330 - 0.2116i	0.0991 + 0.0102i	-0.1544 + 0.0372i	-0.0210 - 0.0016i
0.0325 - 0.0109i	0.2259 - 0.0484i	0.7353 - 0.3922i	-0.0933 - 0.0304i	-1.0461 - 0.0257i	0.0660 - 0.0447i
-0.0322 + 0.0363i	-0.2856 + 0.5677i	-0.6173 + 1.6543i	0.0521 + 0.0286i	0.0873 + 0.2256i	-0.7959 + 0.4363i
-0.0001 + 0.0059i	0.0981 - 0.0039i	0.2326 - 0.0090i	0.0064 - 0.0088i	0.0639 - 0.0371i	-0.0046 - 0.0027i
-0.0086 + 0.0142i	0.0068 + 0.0774i	0.0529 + 0.2957i	0.0480 - 0.0200i	0.0672 - 0.0364i	-0.0396 - 0.0103i
0.0039 - 0.0109i	-0.2683 - 0.0708i	-0.6765 - 0.2144i	-0.0244 + 0.0112i	-0.0798 - 0.2002i	0.2590 + 0.0946i
-0.0218 - 0.0009i	-0.0923 + 0.0023i	-0.1119 - 0.0048i	0.0047 + 0.0057i	0.0145 + 0.0031i	0.0074 - 0.0086i
-0.0773 + 0.0115i	-1.2509 + 0.1690i	-2.7898 + 0.4338i	0.0152 + 0.0690i	0.0879 - 0.0051i	-0.1451 + 0.1535i
0.0227 - 0.0061i	0.4834 - 0.0385i	0.8953 - 0.1150i	0.0123 - 0.0384i	0.0291 + 0.0655i	0.0535 - 0.0618i
-0.0144 + 0.0008i	0.1118 - 0.3377i	0.0886 - 0.7040i	-0.0770 - 0.0005i	-0.0120 + 0.0267i	-0.0203 - 0.0512i
-0.0121 - 0.0052i	0.1646 - 0.2832i	0.1187 - 0.4079i	0.0212 - 0.0099i	-0.1606 - 0.0861i	0.2051 - 0.0535i
0.0054 + 0.0129i	-0.1237 + 0.1855i	-0.2154 + 0.3781i	0.0024 + 0.0117i	-0.0307 + 0.0374i	-0.0015 + 0.0140i
-0.0067 + 0.0045i	-0.1214 - 0.0372i	-0.2847 - 0.0462i	-0.0229 + 0.0258i	-0.0486 + 0.0435i	-0.0163 - 0.0034i
0.0165 + 0.0029i	0.1383 + 0.0665i	0.3047 + 0.1523i	-0.0398 + 0.0031i	-0.2446 + 0.1026i	0.1686 - 0.0926i
-0.0143 - 0.0040i	-0.0921 - 0.0484i	-0.2087 - 0.0926i	0.0196 + 0.0179i	0.0846 + 0.0382i	-0.0418 - 0.0067i

Columns 7 through 12

-0.0048 - 0.0004i	0.0019 + 0.0024i	-0.0105 - 0.0085i	-0.0243 + 0.0020i	-0.0420 + 0.0095i	0.0038 - 0.0008i
-0.0398 + 0.0277i	0.0278 - 0.0054i	-0.0359 - 0.0879i	-0.1313 + 0.0085i	-0.7009 + 0.0921i	0.0904 - 0.0109i
-0.1209 + 0.0654i	0.1911 - 0.0004i	-0.2463 - 0.2678i	-0.2996 + 0.0562i	-1.9620 + 0.3356i	0.2430 - 0.0463i
0.0111 + 0.0021i	0.0699 + 0.0399i	-0.0081 + 0.0098i	0.0095 + 0.0032i	0.0442 + 0.0621i	0.0067 - 0.0016i
0.0165 + 0.0276i	0.0363 + 0.0453i	-0.0202 - 0.0469i	-0.0326 + 0.0117i	-0.1193 + 0.0480i	0.0649 - 0.0333i
0.0065 - 0.0280i	0.1312 - 0.1182i	-0.0118 + 0.2703i	0.0330 - 0.0390i	0.1441 - 0.2607i	-0.0166 + 0.0403i
0.0950 - 0.0009i	-0.1555 - 0.0364i	0.0157 - 0.0013i	0.0044 - 0.0066i	-0.0548 - 0.0072i	-0.0061 + 0.0073i
-0.1182 - 0.0062i	-1.0999 - 0.0472i	0.0699 + 0.0360i	0.0122 - 0.0125i	-0.0264 - 0.0522i	0.0138 + 0.0346i
0.0271 + 0.0174i	0.0189 + 0.3787i	-0.8585 + 0.2630i	0.0025 + 0.0043i	0.1175 + 0.0438i	-0.0038 - 0.0057i
-0.0006 + 0.0003i	-0.0065 + 0.0032i	-0.0078 + 0.0026i	0.0455 + 0.0011i	0.0570 - 0.0028i	-0.0044 + 0.0021i
0.0330 - 0.0156i	-0.0896 + 0.0296i	0.0556 + 0.0680i	0.1010 - 0.0120i	0.7167 - 0.0793i	0.0084 + 0.0122i
-0.0161 - 0.0009i	0.0453 - 0.0556i	-0.0161 - 0.0128i	-0.0319 + 0.0059i	-0.1586 + 0.0150i	0.3082 - 0.0068i
0.0268 + 0.0315i	0.0537 + 0.0217i	-0.0227 + 0.0050i	0.0265 - 0.0067i	-0.0746 + 0.1758i	0.0150 - 0.0086i
0.0338 + 0.0355i	0.1197 + 0.3014i	-0.1268 - 0.0969i	0.0285 + 0.0011i	-0.1169 + 0.1809i	0.0214 - 0.0401i
-0.0036 - 0.0100i	0.0036 - 0.0620i	0.0017 + 0.0233i	-0.0108 - 0.0135i	0.0708 - 0.0996i	-0.0642 + 0.0160i
0.0526 - 0.0011i	-0.0046 + 0.0005i	-0.0085 + 0.0201i	0.0118 - 0.0062i	0.0554 + 0.0214i	-0.0055 - 0.0050i
-0.0403 + 0.0034i	0.0259 + 0.1161i	-0.0259 + 0.0227i	-0.0148 - 0.0066i	-0.0575 - 0.0192i	0.0114 - 0.0146i
0.0115 - 0.0165i	0.0341 - 0.1042i	0.0047 + 0.0237i	0.0168 + 0.0017i	0.0501 + 0.0143i	-0.0165 + 0.0021i

Columns 13 through 18

-0.0277 - 0.0164i	-0.0120 - 0.0045i	0.0171 - 0.0026i	-0.0200 - 0.0055i	-0.0042 + 0.0023i	-0.0093 + 0.0008i
0.2080 + 0.2325i	-0.0792 + 0.0164i	0.0737 - 0.0858i	-0.0274 + 0.0443i	0.0422 - 0.0389i	-0.0839 - 0.0728i
0.4358 + 0.5690i	-0.3777 - 0.0628i	0.1308 - 0.1992i	-0.1228 + 0.1151i	0.0805 - 0.1809i	-0.1680 - 0.2015i
-0.0568 - 0.0276i	-0.0481 + 0.0184i	-0.0036 - 0.0277i	-0.0646 - 0.0611i	-0.0756 - 0.0336i	0.0300 + 0.0025i
0.1531 + 0.0363i	-0.0996 - 0.0301i	0.1985 - 0.0735i	-0.0301 + 0.0243i	0.0919 + 0.1104i	-0.0627 - 0.0287i
-0.1301 + 0.0001i	0.0037 - 0.0234i	-0.0048 + 0.0125i	-0.0009 - 0.0233i	-0.0187 + 0.0077i	0.0468 - 0.0037i
0.0842 - 0.0482i	0.0434 - 0.0193i	-0.0057 - 0.0103i	0.0652 - 0.0002i	0.0910 + 0.0120i	-0.0488 + 0.0127i
-0.0139 + 0.0203i	-0.1096 + 0.0797i	0.0591 - 0.0159i	-0.1385 - 0.0125i	0.1576 + 0.0536i	-0.2481 + 0.0259i
0.0233 - 0.0560i	0.0804 + 0.0105i	-0.0110 + 0.0058i	0.0296 + 0.0051i	0.0210 - 0.0486i	0.0184 + 0.0578i
-0.0047 - 0.0035i	0.0166 + 0.0001i	0.0046 + 0.0138i	-0.0077 + 0.0034i	-0.0028 + 0.0101i	-0.0006 + 0.0054i
-0.1172 - 0.1584i	0.0538 - 0.0509i	-0.0296 + 0.0373i	0.0500 - 0.0426i	0.0207 + 0.0185i	0.0314 + 0.0707i
0.0175 + 0.0756i	0.0084 + 0.0351i	-0.1043 - 0.0443i	-0.0029 + 0.0155i	-0.0159 + 0.0180i	-0.0143 - 0.0307i
0.3388 - 0.0194i	-0.1092 + 0.0284i	0.0008 + 0.0099i	0.0931 + 0.0872i	-0.0187 - 0.0207i	-0.0228 - 0.0019i
-0.2052 - 0.0192i	-0.9136 + 0.0381i	-0.1402 + 0.1001i	0.0686 + 0.0404i	-0.0876 - 0.1642i	0.1308 + 0.0647i
0.0189 + 0.0133i	0.0493 + 0.1435i	-0.8968 + 0.3329i	-0.0043 + 0.0066i	0.0119 - 0.0413i	-0.0837 + 0.1472i
0.0732 - 0.0890i	-0.0004 + 0.0164i	-0.0022 - 0.0363i	0.2398 - 0.0036i	-0.1268 - 0.0011i	0.0053 + 0.0363i
0.0681 + 0.0010i	-0.0742 + 0.0434i	0.0395 - 0.1016i	-0.2346 + 0.0173i	-0.9675 - 0.0098i	-0.0424 + 0.0980i
-0.0698 - 0.0222i	-0.0250 - 0.0448i	0.1402 + 0.0478i	0.0532 - 0.0170i	0.0412 + 0.1853i	-0.9533 + 0.2091i

S.S21 =
Columns 1 through 6

0.0420 - 0.0020i	0.1047 - 0.0213i	0.2271 - 0.0454i	0.0148 + 0.0075i	0.0179 - 0.0023i	0.0216 - 0.0159i
0.1218 - 0.0066i	1.5861 - 0.1963i	3.0145 - 0.4969i	-0.0624 - 0.1215i	-0.1892 - 0.1668i	0.1514 - 0.1432i
0.2411 - 0.0481i	4.2182 - 0.7145i	10.0658 - 1.8093i	-0.0860 - 0.2993i	-0.5276 - 0.2758i	0.4757 - 0.6314i
-0.0027 - 0.0078i	-0.1228 - 0.0916i	-0.3330 - 0.2116i	0.0991 + 0.0102i	-0.1544 + 0.0372i	-0.0210 - 0.0016i
0.0325 - 0.0109i	0.2259 - 0.0484i	0.7353 - 0.3922i	-0.0933 - 0.0304i	-1.0461 - 0.0257i	0.0660 - 0.0447i
-0.0322 + 0.0363i	-0.2856 + 0.5677i	-0.6173 + 1.6543i	0.0521 + 0.0286i	0.0873 + 0.2256i	-0.7959 + 0.4363i
-0.0001 + 0.0059i	0.0981 - 0.0039i	0.2326 - 0.0090i	0.0064 - 0.0088i	0.0639 - 0.0371i	-0.0046 - 0.0027i
-0.0086 + 0.0142i	0.0068 + 0.0774i	0.0529 + 0.2957i	0.0480 - 0.0200i	0.0672 - 0.0364i	-0.0396 - 0.0103i
0.0039 - 0.0109i	-0.2683 - 0.0708i	-0.6765 - 0.2144i	-0.0244 + 0.0112i	-0.0798 - 0.2002i	0.2590 + 0.0946i
-0.0218 - 0.0009i	-0.0923 + 0.0023i	-0.1119 - 0.0048i	0.0047 + 0.0057i	0.0145 + 0.0031i	0.0074 - 0.0086i
-0.0773 + 0.0115i	-1.2509 + 0.1690i	-2.7898 + 0.4338i	0.0152 + 0.0690i	0.0879 - 0.0051i	-0.1451 + 0.1535i
0.0227 - 0.0061i	0.4834 - 0.0385i	0.8953 - 0.1150i	0.0123 - 0.0384i	0.0291 + 0.0655i	0.0535 - 0.0618i
-0.0144 + 0.0008i	0.1118 - 0.3377i	0.0886 - 0.7040i	-0.0770 - 0.0005i	-0.0120 + 0.0267i	-0.0203 - 0.0512i
-0.0121 - 0.0052i	0.1646 - 0.2832i	0.1187 - 0.4079i	0.0212 - 0.0099i	-0.1606 - 0.0861i	0.2051 - 0.0535i
0.0054 + 0.0129i	-0.1237 + 0.1855i	-0.2154 + 0.3781i	0.0024 + 0.0117i	-0.0307 + 0.0374i	-0.0015 + 0.0140i
-0.0067 + 0.0045i	-0.1214 - 0.0372i	-0.2847 - 0.0462i	-0.0229 + 0.0258i	-0.0486 + 0.0435i	-0.0163 - 0.0034i
0.0165 + 0.0029i	0.1383 + 0.0665i	0.3047 + 0.1523i	-0.0398 + 0.0031i	-0.2446 + 0.1026i	0.1686 - 0.0926i

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

-0.0143 - 0.0040i -0.0921 - 0.0484i -0.2087 - 0.0926i 0.0196 + 0.0179i 0.0846 + 0.0382i -0.0418 - 0.0067i

Columns 7 through 12

-0.0048 - 0.0004i 0.0019 + 0.0024i -0.0105 - 0.0085i -0.0243 + 0.0020i -0.0420 + 0.0095i 0.0038 - 0.0008i
-0.0398 + 0.0277i 0.0278 - 0.0054i -0.0359 - 0.0879i -0.1313 + 0.0085i -0.7009 + 0.0921i 0.0904 - 0.0109i
-0.1209 + 0.0654i 0.1911 - 0.0004i -0.2463 - 0.2678i -0.2996 + 0.0562i -1.9620 + 0.3356i 0.2430 - 0.0463i
0.0111 + 0.0021i 0.0699 + 0.0399i -0.0081 + 0.0098i 0.0095 + 0.0032i 0.0442 + 0.0621i 0.0067 - 0.0016i
0.0165 + 0.0276i 0.0363 + 0.0453i -0.0202 - 0.0469i -0.0326 + 0.0117i -0.1193 + 0.0480i 0.0649 - 0.0333i
0.0065 - 0.0280i 0.1312 - 0.1182i -0.0118 + 0.2703i 0.0330 - 0.0390i 0.1441 - 0.2607i -0.0166 + 0.0403i
0.0950 - 0.0009i -0.1555 - 0.0364i 0.0157 - 0.0013i 0.0044 - 0.0066i -0.0548 - 0.0072i -0.0061 + 0.0073i
-0.1182 - 0.0062i -1.0999 - 0.0472i 0.0699 + 0.0360i 0.0122 - 0.0125i -0.0264 - 0.0522i 0.0138 - 0.0346i
0.0271 + 0.0174i 0.0189 + 0.3787i -0.0585 + 0.2630i 0.0025 + 0.0043i 0.1175 + 0.0458i -0.0038 - 0.0057i
-0.0006 + 0.0003i -0.0065 + 0.0032i -0.0078 + 0.0026i 0.0455 + 0.0011i 0.0570 - 0.0028i -0.0044 + 0.0021i
0.0330 - 0.0156i -0.0896 + 0.0296i 0.0556 + 0.0680i 0.1010 - 0.0120i 0.7167 - 0.0793i 0.0084 + 0.0122i
-0.0161 - 0.0009i 0.0453 - 0.0556i -0.0161 - 0.0128i -0.0319 + 0.0059i -0.1586 + 0.0150i 0.3082 - 0.0068i
0.0268 + 0.0315i 0.0537 + 0.0217i -0.0227 + 0.0050i 0.0265 - 0.0067i -0.0746 + 0.1758i 0.0150 - 0.0086i
0.0338 + 0.0355i 0.1197 + 0.3014i -0.1268 - 0.0969i 0.0285 + 0.0011i -0.1169 + 0.1809i 0.0214 - 0.0401i
-0.0036 - 0.0100i 0.0036 + 0.0620i 0.0017 + 0.0233i -0.0108 - 0.0135i 0.0708 - 0.0996i -0.0642 + 0.0160i
0.0526 - 0.0011i -0.0046 + 0.0005i -0.0085 + 0.0201i 0.0118 - 0.0062i 0.0554 + 0.0214i -0.0055 - 0.0050i
-0.0403 + 0.0034i 0.2259 + 0.1161i -0.2151 + 0.0227i -0.0148 - 0.0066i -0.0579 - 0.0192i 0.0114 - 0.0146i
0.0115 - 0.0165i 0.0341 - 0.1042i 0.0047 + 0.0237i 0.0168 + 0.0017i 0.0501 + 0.0143i -0.0165 + 0.0021i

Columns 13 through 18

-0.0277 - 0.0164i -0.0120 - 0.0045i 0.0171 - 0.0026i -0.0200 - 0.0055i -0.0042 + 0.0023i -0.0093 + 0.0008i
0.2080 + 0.2325i -0.0792 + 0.0164i 0.0737 - 0.0858i -0.0274 + 0.0443i 0.0422 - 0.0389i -0.0839 - 0.0728i
0.4358 + 0.5690i -0.3777 - 0.0628i 0.1308 - 0.1992i -0.1228 + 0.1151i 0.0805 - 0.1809i -0.1680 - 0.2015i
-0.0568 - 0.0276i -0.0481 + 0.0184i -0.0036 - 0.0277i -0.0646 - 0.0611i -0.0756 - 0.0336i 0.0300 + 0.0025i
0.1531 + 0.0363i -0.0996 - 0.0301i 0.1985 - 0.0735i -0.0301 + 0.0243i 0.0919 + 0.1104i -0.0627 - 0.0287i
-0.1301 + 0.0001i 0.0037 - 0.0234i -0.0048 + 0.0125i -0.0009 - 0.0233i -0.0187 + 0.0077i 0.0468 - 0.0037i
0.0842 - 0.0482i 0.0434 - 0.0193i -0.0057 - 0.0103i 0.0652 - 0.0002i 0.0910 + 0.0120i -0.0488 + 0.0127i
-0.0139 + 0.0203i -0.1096 + 0.0797i 0.0591 - 0.0159i -0.1385 - 0.0125i 0.1576 + 0.0536i -0.2481 + 0.0259i
0.0233 - 0.0560i 0.0804 + 0.0105i -0.0110 + 0.0058i 0.0296 + 0.0051i 0.0210 - 0.0486i 0.0184 + 0.0578i
-0.0047 - 0.0035i 0.0166 + 0.0001i 0.0046 + 0.0138i -0.0077 + 0.0034i -0.0028 + 0.0101i -0.0006 + 0.0054i
-0.1172 - 0.1584i 0.0538 - 0.0509i -0.0296 + 0.0373i 0.0500 - 0.0426i 0.0207 + 0.0185i 0.0314 + 0.0707i
0.0175 + 0.0756i 0.0084 + 0.0351i -0.1043 - 0.0443i -0.0029 + 0.0155i -0.0159 + 0.0180i -0.0143 - 0.0307i
0.3388 - 0.0194i -0.1092 + 0.0284i 0.0008 + 0.0099i 0.0931 + 0.0872i -0.0187 - 0.0207i -0.0228 - 0.0019i
-0.2052 - 0.0192i -0.9136 + 0.0381i -0.1402 + 0.1001i 0.0686 + 0.0404i -0.0876 - 0.1642i 0.1308 - 0.0647i
0.0189 + 0.0133i 0.0493 + 0.1435i -0.8968 + 0.3329i -0.0043 + 0.0066i 0.0119 - 0.0413i -0.0837 + 0.1472i
0.0732 - 0.0890i -0.0004 + 0.0164i -0.0022 - 0.0363i 0.2398 - 0.0036i -0.1268 - 0.0011i 0.0053 + 0.0363i
0.0681 + 0.0010i -0.0742 + 0.0434i 0.0395 - 0.1016i -0.2346 + 0.0173i -0.9675 - 0.0098i -0.0424 + 0.0980i
-0.0698 - 0.0222i -0.0250 - 0.0448i 0.1402 + 0.0478i 0.0532 - 0.0170i 0.0412 + 0.1853i -0.9533 + 0.2091i

S.S22 =

Columns 1 through 6

-0.3293 - 0.0021i 0.0776 - 0.0198i 0.2408 - 0.0412i -0.0150 - 0.0215i 0.0126 + 0.0149i 0.0026 - 0.0087i
0.1285 - 0.0092i 1.5376 - 0.1978i 3.0757 - 0.4910i -0.0423 - 0.0953i -0.1283 - 0.0371i 0.1242 - 0.1572i
0.2370 - 0.0461i 4.2838 - 0.7082i 10.3487 - 1.8322i -0.0819 - 0.3042i -0.5565 - 0.3260i 0.5729 - 0.5700i
-0.0244 + 0.0167i -0.0973 - 0.1187i -0.3325 - 0.2127i -0.7550 + 0.0114i 0.0266 + 0.0151i -0.0432 + 0.0028i
0.0164 - 0.0044i 0.2434 - 0.0897i 0.7979 - 0.4038i -0.0008 - 0.0180i 0.0373 + 0.0089i -0.0152 - 0.0072i
-0.0010 + 0.0169i -0.2249 + 0.6325i -0.8946 + 1.5272i 0.0545 + 0.0043i 0.0263 - 0.3178i -0.1352 - 0.0918i
-0.0113 - 0.0023i 0.1039 + 0.0069i 0.2292 - 0.0036i -0.0744 + 0.0542i -0.0574 - 0.0027i 0.0235 - 0.0101i
0.0097 - 0.0028i -0.0295 + 0.1117i 0.0533 + 0.2935i 0.0131 - 0.0049i -0.1360 + 0.0868i 0.0495 - 0.0093i
-0.0242 + 0.0082i -0.2483 - 0.0751i -0.6401 - 0.2553i -0.0049 + 0.0226i 0.1704 + 0.2451i -0.2996 - 0.0037i
-0.4743 - 0.0001i -0.1543 + 0.0021i -0.0953 - 0.0034i -0.0254 - 0.0273i 0.0376 + 0.0296i -0.0082 + 0.0190i
-0.1319 + 0.0092i -1.7908 + 0.1706i -2.8089 + 0.4333i 0.0603 + 0.1184i 0.1123 + 0.0745i -0.1217 + 0.1303i
0.0304 - 0.0045i 0.3745 + 0.0427i 0.9804 - 0.1199i -0.0240 - 0.0215i -0.0665 - 0.0630i 0.0485 - 0.0425i
-0.0311 + 0.0225i 0.1269 - 0.3474i 0.0937 - 0.7096i -0.3813 + 0.0002i 0.0097 + 0.0284i -0.0317 - 0.0511i
0.0209 - 0.0312i 0.0640 - 0.1613i 0.2666 - 0.4318i 0.0089 + 0.0082i 0.2015 + 0.1224i -0.2187 - 0.0247i
-0.0166 + 0.0187i -0.1184 + 0.1770i -0.2525 + 0.3449i 0.0027 - 0.0030i -0.0449 - 0.0559i 0.0077 + 0.0438i
-0.0069 + 0.0090i -0.1208 - 0.0446i -0.2885 - 0.0517i -0.0018 + 0.0113i -0.0126 + 0.0280i -0.0201 + 0.0084i
-0.0003 + 0.0075i 0.1665 + 0.0685i 0.3405 + 0.1163i 0.0104 - 0.0089i 0.1798 - 0.0849i -0.1251 + 0.0726i
-0.0008 - 0.0041i -0.1108 - 0.0597i -0.2103 - 0.0842i 0.0011 + 0.0049i -0.0359 - 0.0475i 0.0089 + 0.0158i

Columns 7 through 12

-0.0226 + 0.0063i 0.0082 - 0.0121i 0.0010 - 0.0069i -0.4780 + 0.0025i -0.0963 + 0.0131i 0.0255 - 0.0048i
-0.0281 + 0.0207i 0.1223 - 0.0199i -0.0672 - 0.0724i -0.1758 + 0.0086i -1.2219 + 0.0943i -0.0042 - 0.0145i
-0.1275 + 0.0647i 0.1459 - 0.0160i -0.1703 - 0.3013i -0.3002 + 0.0552i -1.9915 + 0.3296i 0.3072 - 0.0457i
-0.0671 - 0.0655i -0.0611 - 0.0335i 0.0137 + 0.0260i -0.0206 + 0.0302i 0.0918 + 0.0138i -0.0432 - 0.0136i
0.0091 + 0.0182i -0.0658 - 0.1043i -0.0042 - 0.0261i -0.0038 - 0.0034i -0.1119 + 0.0273i -0.0112 + 0.0010i
-0.0191 - 0.0140i -0.1333 + 0.1710i 0.0840 - 0.2163i 0.0066 - 0.0357i 0.0906 - 0.2935i -0.0237 + 0.0408i
-0.7087 + 0.0027i 0.0533 + 0.0237i -0.0209 - 0.0164i -0.0019 - 0.0075i -0.0390 + 0.0130i 0.0204 - 0.0082i
0.0195 - 0.0024i 0.1635 + 0.0600i -0.0542 + 0.0283i -0.0134 + 0.0030i 0.0297 - 0.0402i -0.0042 - 0.0142i
0.0166 - 0.0154i -0.0811 - 0.3862i -0.1322 - 0.1704i 0.0289 + 0.0022i 0.1219 + 0.0207i -0.0307 - 0.0060i
-0.0142 + 0.0078i 0.0022 - 0.0075i 0.0077 - 0.0028i -0.2135 + 0.0008i 0.0291 + 0.0005i 0.0139 - 0.0023i
0.0488 - 0.0341i -0.0209 - 0.0094i 0.0422 + 0.0804i 0.0821 - 0.0144i -0.0026 - 0.0793i -0.1896 + 0.0095i
-0.0041 + 0.0146i -0.0257 + 0.0614i -0.0182 - 0.0369i -0.0138 + 0.0090i -0.3117 + 0.0197i -1.0511 + 0.0034i
0.0124 + 0.0214i 0.0368 - 0.0036i -0.0202 + 0.0224i 0.0352 - 0.0196i -0.0658 + 0.1608i 0.0011 - 0.0203i
0.0006 + 0.0001i -0.0779 - 0.2534i 0.0985 + 0.0983i -0.0217 + 0.0337i -0.0230 + 0.0668i 0.0185 - 0.0047i
-0.0169 + 0.0051i -0.0471 + 0.0365i 0.0190 - 0.0160i 0.0136 - 0.0277i 0.0679 - 0.0945i 0.0245 + 0.0415i
0.3868 - 0.0019i -0.0546 - 0.0180i 0.0152 + 0.0218i 0.0228 - 0.0064i 0.0477 + 0.0164i -0.0120 + 0.0037i
-0.0447 - 0.0011i -0.3166 - 0.1210i 0.2146 - 0.0182i -0.0063 - 0.0085i -0.0967 - 0.0485i 0.0113 + 0.0302i
0.0214 + 0.0093i 0.0752 + 0.0938i -0.0030 - 0.0107i 0.0005 + 0.0080i 0.0515 + 0.0428i -0.0014 - 0.0141i

Columns 13 through 18

-0.0599 - 0.0479i 0.0184 + 0.0173i 0.0045 + 0.0140i -0.0298 - 0.0045i 0.0070 - 0.0016i 0.0024 - 0.0101i
0.2259 + 0.2340i -0.0869 + 0.0219i 0.0729 - 0.0941i -0.0256 + 0.0522i -0.0092 - 0.0456i -0.0444 - 0.0849i
0.4389 + 0.5792i -0.3846 - 0.0713i 0.1454 - 0.1953i -0.1292 + 0.1121i 0.0827 - 0.1675i -0.1727 - 0.2085i
-0.3602 - 0.0269i 0.0059 + 0.0076i -0.0278 - 0.0050i -0.0431 - 0.0551i 0.0148 + 0.0182i -0.0240 + 0.0283i
0.0116 + 0.0390i 0.1062 + 0.0428i -0.1781 + 0.0499i 0.0574 + 0.0458i -0.0113 - 0.0690i 0.0185 + 0.0165i
-0.1213 + 0.0251i 0.0094 - 0.0624i 0.0320 + 0.0524i -0.0374 - 0.0351i -0.0080 + 0.0141i 0.0275 + 0.0086i
0.0732 - 0.0412i -0.0155 - 0.0009i 0.0263 - 0.0126i 0.4128 + 0.0027i -0.0325 - 0.0180i 0.0285 + 0.0132i
-0.0716 + 0.0315i 0.0358 - 0.0429i -0.0730 + 0.0127i -0.0079 - 0.0013i -0.2718 - 0.0553i 0.2640 - 0.0220i
-0.0018 - 0.0383i 0.0157 - 0.0064i -0.0188 + 0.0024i 0.0403 - 0.0007i 0.0672 + 0.0632i -0.0134 - 0.0326i
-0.0151 - 0.0072i 0.0153 + 0.0088i -0.0106 + 0.0040i -0.0080 + 0.0058i 0.0015 - 0.0019i 0.0065 + 0.0041i
-0.1063 - 0.1562i 0.0824 + 0.0123i -0.0381 + 0.0452i 0.0466 - 0.0392i -0.0284 + 0.0484i 0.0611 + 0.0402i
0.0082 + 0.0558i -0.0611 - 0.0396i 0.0544 + 0.0743i -0.0211 + 0.0114i 0.0160 - 0.0393i 0.0026 + 0.0205i
0.4917 - 0.0208i 0.0033 + 0.0237i -0.0058 + 0.0213i 0.1201 + 0.1171i -0.0347 - 0.0132i -0.0358 - 0.0365i
-0.0073 - 0.0188i -0.1043 - 0.0151i 0.1367 + 0.0321i 0.0383 + 0.0257i 0.0918 + 0.1850i -0.0834 - 0.1238i

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

0.0176 + 0.0027i -0.0177 - 0.1672i -0.0873 - 0.2102i -0.0643 + 0.0054i -0.0246 + 0.0280i 0.0190 - 0.0640i
0.0978 - 0.1198i -0.0097 + 0.0184i -0.0057 - 0.0025i 0.3548 - 0.0063i -0.0037 + 0.0049i -0.0171 + 0.0386i
0.0535 + 0.0151i 0.0708 - 0.0766i -0.0830 + 0.0320i -0.0589 + 0.0022i -0.0521 - 0.0044i 0.0400 + 0.0638i
-0.0168 - 0.0467i 0.0199 + 0.0731i -0.0626 + 0.0124i 0.0533 - 0.0193i -0.0263 - 0.1762i -0.0354 - 0.1136i

SG.S11 =
Columns 1 through 6

-0.3293 - 0.0021i 0.0776 - 0.0198i 0.2408 - 0.0412i -0.0150 - 0.0215i 0.0126 + 0.0149i 0.0026 - 0.0087i
0.1285 - 0.0092i 1.5376 - 0.1978i 3.0757 - 0.4910i -0.0423 - 0.0953i -0.1283 - 0.0371i 0.1242 - 0.1572i
0.2370 - 0.0461i 4.2838 - 0.7082i 10.3487 - 1.8322i -0.0819 - 0.3042i -0.5565 - 0.3260i 0.5729 - 0.5700i
-0.0244 + 0.0167i -0.0973 - 0.1187i -0.3325 - 0.2127i -0.7550 + 0.0114i 0.0266 + 0.0151i -0.0432 + 0.0028i
0.0164 - 0.0044i 0.2434 - 0.0897i 0.7979 - 0.4038i -0.0008 - 0.0180i 0.0373 + 0.0089i -0.0152 - 0.0072i
-0.0010 + 0.0169i -0.2249 + 0.6325i -0.8946 + 1.5272i 0.0545 + 0.0043i 0.0263 - 0.3178i -0.1352 - 0.0918i
-0.0113 - 0.0023i 0.1039 + 0.0069i 0.2292 - 0.0036i -0.0744 + 0.0542i -0.0574 - 0.0027i 0.0235 - 0.0101i
0.0097 - 0.0028i -0.0295 + 0.1117i 0.0533 + 0.2935i 0.0131 - 0.0049i -0.1360 + 0.0868i 0.0495 - 0.0093i
-0.0242 + 0.0082i -0.2483 - 0.0751i -0.6401 - 0.2553i -0.0049 + 0.0226i 0.1704 + 0.2451i -0.2996 - 0.0037i
-0.4743 - 0.0001i -0.1543 + 0.0021i -0.0953 - 0.0034i -0.0254 - 0.0273i 0.0376 + 0.0296i -0.0082 + 0.0190i
-0.1319 + 0.0092i -1.7908 + 0.1706i -2.8089 + 0.4333i 0.0603 + 0.1184i 0.1123 + 0.0745i -0.1217 + 0.1303i
0.0304 - 0.0045i 0.3745 - 0.0427i 0.9804 - 0.1199i -0.0240 - 0.0215i -0.0665 - 0.0630i 0.0485 - 0.0425i
-0.0311 + 0.0225i 0.1269 - 0.3474i 0.0937 - 0.7096i -0.3813 + 0.0002i 0.0097 + 0.0284i -0.0317 - 0.0511i
0.0209 - 0.0312i 0.0640 - 0.1613i 0.2666 - 0.4318i 0.0089 + 0.0082i 0.2015 + 0.1224i -0.2187 - 0.0247i
-0.0166 + 0.0187i -0.1184 + 0.1770i -0.2525 + 0.3449i 0.0027 - 0.0030i -0.0449 - 0.0559i 0.0077 + 0.0438i
-0.0069 + 0.0090i -0.1208 - 0.0446i -0.2885 - 0.0517i -0.0018 - 0.0113i -0.0126 + 0.0280i -0.0201 + 0.0084i
-0.0003 + 0.0075i 0.1665 + 0.0685i 0.3405 + 0.1163i 0.0104 - 0.0089i 0.1798 - 0.0849i -0.1251 + 0.0726i
-0.0008 - 0.0041i -0.1108 - 0.0597i -0.2103 - 0.0842i 0.0011 + 0.0049i -0.0359 - 0.0475i 0.0089 + 0.0158i

Columns 7 through 12

-0.0226 + 0.0063i 0.0082 - 0.0121i 0.0010 - 0.0069i -0.4780 + 0.0025i -0.0963 + 0.0131i 0.0255 - 0.0048i
-0.0281 + 0.0207i 0.1223 - 0.0199i -0.0672 - 0.0724i -0.1758 + 0.0086i -1.2219 + 0.0943i -0.0042 - 0.0145i
-0.1275 + 0.0647i 0.1459 - 0.0160i -0.1703 - 0.3013i -0.3002 + 0.0552i -1.9915 + 0.3296i 0.3072 - 0.0457i
-0.0671 - 0.0655i -0.0611 - 0.0335i 0.0137 + 0.0260i -0.0206 + 0.0302i 0.0918 + 0.0138i -0.0432 - 0.0136i
0.0091 + 0.0182i -0.0658 - 0.1043i -0.0042 - 0.0261i -0.0038 - 0.0034i -0.1119 - 0.0273i -0.0112 + 0.0010i
-0.0191 - 0.0140i -0.1333 + 0.1710i 0.0840 - 0.2163i 0.0066 - 0.0357i 0.0906 - 0.2935i -0.0237 + 0.0408i
-0.7087 + 0.0027i 0.0533 + 0.0237i -0.0209 - 0.0164i -0.0019 - 0.0075i -0.0390 + 0.0130i 0.0204 - 0.0082i
0.0195 - 0.0024i 0.1635 + 0.0600i -0.0542 + 0.0283i -0.0134 + 0.0030i 0.0297 - 0.0402i -0.0042 - 0.0142i
0.0166 - 0.0154i -0.0811 - 0.3862i -0.1322 - 0.1704i 0.0289 + 0.0022i 0.1219 + 0.0207i -0.0307 - 0.0060i
-0.0142 + 0.0078i 0.0022 - 0.0075i 0.0077 - 0.0028i -0.2135 + 0.0008i 0.0291 + 0.0005i 0.0139 - 0.0023i
0.0488 - 0.0341i -0.0209 - 0.0094i 0.0422 + 0.0804i 0.0821 - 0.0144i -0.0026 - 0.0793i -0.1896 + 0.0095i
-0.0041 + 0.0146i -0.0257 + 0.0614i -0.0182 - 0.0369i -0.0138 + 0.0090i -0.3117 + 0.0197i -1.0511 + 0.0034i
0.0124 + 0.0214i 0.0368 - 0.0036i -0.0202 + 0.0224i 0.0352 - 0.0196i -0.0658 + 0.1608i 0.0011 - 0.0203i
0.0006 + 0.0001i -0.0779 - 0.2534i 0.0985 + 0.0983i -0.0217 + 0.0337i -0.0230 + 0.0668i 0.0185 - 0.0047i
-0.0169 + 0.0051i -0.0471 + 0.0365i 0.0190 - 0.0160i 0.0136 - 0.0277i 0.0679 - 0.0945i 0.0245 + 0.0415i
0.3868 - 0.0019i -0.0546 - 0.0180i 0.0152 + 0.0218i 0.0228 - 0.0064i 0.0477 + 0.0164i -0.0120 + 0.0037i
-0.0447 - 0.0011i 0.3166 - 0.1210i 0.2146 - 0.0182i -0.0063 - 0.0085i -0.0967 - 0.0485i 0.0113 + 0.0302i
0.0214 + 0.0093i 0.0752 + 0.0938i -0.0030 - 0.0107i 0.0005 + 0.0080i 0.0515 + 0.0428i -0.0014 - 0.0141i

Columns 13 through 18

-0.0599 - 0.0479i 0.0184 + 0.0173i 0.0045 + 0.0140i -0.0298 - 0.0045i 0.0070 - 0.0016i 0.0024 - 0.0101i
0.2259 + 0.2340i -0.0869 + 0.0219i 0.0729 - 0.0941i -0.0256 + 0.0522i -0.0092 - 0.0456i -0.0444 - 0.0849i
0.4389 + 0.5792i -0.3846 - 0.0713i 0.1454 - 0.1953i -0.1292 + 0.1121i 0.0827 - 0.1675i -0.1727 - 0.2085i
-0.3602 - 0.0269i 0.0059 + 0.0076i -0.0278 - 0.0050i -0.0431 - 0.0551i 0.0148 + 0.0182i -0.0240 + 0.0283i
0.0116 + 0.0390i 0.1062 + 0.0428i -0.1781 + 0.0499i 0.0574 + 0.0458i -0.0113 - 0.0690i 0.0185 + 0.0165i
-0.1213 + 0.0251i 0.0094 - 0.0624i 0.0320 + 0.0524i -0.0374 - 0.0351i -0.0080 + 0.0141i 0.0275 + 0.0086i
0.0732 - 0.0412i -0.0155 - 0.0009i 0.0263 - 0.0126i 0.4128 + 0.0027i -0.0325 - 0.0180i 0.0285 + 0.0132i
-0.0716 + 0.0315i 0.0358 - 0.0429i -0.0730 + 0.0127i -0.0079 - 0.0013i -0.2718 - 0.0553i 0.2640 - 0.0220i
-0.0018 - 0.0383i 0.0157 - 0.0064i -0.0188 + 0.0024i -0.0403 - 0.0007i 0.0672 + 0.0632i -0.0134 - 0.0326i
-0.0151 - 0.0072i 0.0153 + 0.0088i -0.0106 + 0.0040i -0.0080 + 0.0058i 0.0015 - 0.0019i 0.0065 + 0.0041i
-0.1063 - 0.1562i 0.0824 + 0.0123i -0.0381 + 0.0452i 0.0466 - 0.0392i -0.0284 + 0.0484i 0.0611 + 0.0402i
0.0082 + 0.0558i -0.0611 - 0.0396i 0.0544 + 0.0743i -0.0211 + 0.0114i 0.0160 - 0.0393i 0.0026 + 0.0205i
0.4917 - 0.0208i 0.0033 + 0.0237i -0.0058 + 0.0213i 0.1201 + 0.1171i -0.0347 - 0.0132i -0.0358 - 0.0365i
-0.0073 - 0.0188i -0.1043 - 0.0151i 0.1367 + 0.0321i 0.0383 + 0.0257i 0.0918 + 0.1850i -0.0834 - 0.1238i
0.0176 + 0.0027i -0.0177 - 0.1672i -0.0873 - 0.2102i -0.0643 + 0.0054i -0.0246 + 0.0280i 0.0190 - 0.0640i
0.0978 - 0.1198i -0.0097 + 0.0184i -0.0057 - 0.0025i 0.3548 - 0.0063i -0.0037 + 0.0049i -0.0171 + 0.0386i
0.0535 + 0.0151i 0.0708 - 0.0766i -0.0830 + 0.0320i -0.0589 + 0.0022i -0.0521 - 0.0044i 0.0400 + 0.0638i
-0.0168 - 0.0467i 0.0199 + 0.0731i -0.0626 + 0.0124i 0.0533 - 0.0193i -0.0263 - 0.1762i -0.0354 - 0.1136i

SG.S12 =
Columns 1 through 6

0.0420 - 0.0020i 0.1047 - 0.0213i 0.2271 - 0.0454i 0.0148 + 0.0075i 0.0179 - 0.0023i 0.0216 - 0.0159i
0.1218 - 0.0066i 1.5861 - 0.1963i 3.0145 - 0.4969i -0.0624 - 0.1215i -0.1892 - 0.1668i 0.1514 - 0.1432i
0.2411 - 0.0481i 4.2182 - 0.7145i 10.0658 - 1.8093i -0.0860 - 0.2993i -0.5276 - 0.2758i 0.4757 - 0.6314i
-0.0027 - 0.0078i -0.1228 - 0.0916i -0.3330 - 0.2116i 0.0991 + 0.0102i -0.1544 + 0.0372i -0.0210 - 0.0016i
0.0325 - 0.0109i 0.2259 - 0.0484i 0.7353 - 0.3922i -0.0933 - 0.0304i -1.0461 - 0.0257i 0.0660 - 0.0447i
-0.0322 + 0.0363i -0.2856 + 0.5677i -0.6173 + 1.6543i 0.0521 + 0.0286i 0.0873 + 0.2256i -0.7959 + 0.4363i
-0.0001 + 0.0059i 0.0981 - 0.0039i 0.2326 - 0.0090i 0.0064 - 0.0088i 0.0639 - 0.0371i -0.0046 - 0.0027i
-0.0086 + 0.0142i 0.0068 - 0.0774i 0.0529 + 0.2957i 0.0480 - 0.0200i 0.0672 - 0.0364i -0.0396 - 0.0103i
0.0039 - 0.0109i -0.2683 - 0.0708i -0.6765 - 0.2144i -0.0244 + 0.0112i -0.0798 - 0.2002i 0.2590 + 0.0946i
-0.0218 - 0.0009i -0.0923 + 0.0023i -0.1119 - 0.0048i 0.0047 + 0.0057i 0.0145 + 0.0031i 0.0074 - 0.0086i
-0.0773 + 0.0115i -1.2509 + 0.1690i -2.7898 + 0.4338i 0.0152 + 0.0690i 0.0879 - 0.0051i -0.1451 + 0.1535i
0.0227 - 0.0061i 0.4834 - 0.0385i 0.8953 - 0.1150i 0.0123 - 0.0384i 0.0291 + 0.0655i 0.0535 - 0.0618i
-0.0144 + 0.0008i 0.1118 - 0.3377i 0.0886 - 0.7040i -0.0770 - 0.0005i -0.0120 + 0.0267i -0.0203 - 0.0512i
-0.0121 - 0.0052i 0.1646 - 0.2832i 0.1187 - 0.4079i 0.0212 - 0.0099i -0.1606 - 0.0861i 0.2051 - 0.0535i
0.0054 + 0.0129i -0.1237 + 0.1855i -0.2154 + 0.3781i 0.0024 + 0.0117i -0.0307 + 0.0374i -0.0015 + 0.0140i
-0.0067 + 0.0045i -0.1214 - 0.0372i -0.2847 + 0.0462i -0.0229 + 0.0258i -0.0486 + 0.0435i -0.0163 - 0.0034i
0.0165 + 0.0029i 0.1383 + 0.0665i 0.3047 + 0.1523i -0.0398 + 0.0031i -0.2446 + 0.1026i 0.1686 - 0.0926i
-0.0143 - 0.0040i -0.0921 - 0.0484i -0.2087 - 0.0926i 0.0196 + 0.0179i 0.0846 + 0.0382i -0.0418 - 0.0067i

Columns 7 through 12

-0.0048 - 0.0004i 0.0019 + 0.0024i -0.0105 - 0.0085i -0.0243 + 0.0020i -0.0420 + 0.0095i 0.0038 - 0.0008i
-0.0398 + 0.0277i 0.0278 - 0.0054i -0.0359 - 0.0879i -0.1313 + 0.0085i -0.7009 + 0.0921i 0.0904 - 0.0109i
-0.1209 + 0.0654i 0.1911 - 0.0004i -0.2463 - 0.2678i -0.2996 + 0.0562i -1.9620 + 0.3356i 0.2430 - 0.0463i
0.0111 + 0.0021i 0.0699 + 0.0399i -0.0081 + 0.0098i 0.0095 + 0.0032i 0.0442 + 0.0621i 0.0067 - 0.0016i
0.0165 + 0.0276i 0.0363 + 0.0453i -0.0202 - 0.0469i -0.0326 + 0.0117i -0.1193 + 0.0480i 0.0649 - 0.0333i
0.0065 - 0.0280i 0.1312 - 0.1182i -0.0118 + 0.2703i 0.0330 - 0.0390i 0.1441 - 0.2607i -0.0166 + 0.0403i
0.0950 - 0.0009i -0.1555 - 0.0364i 0.0157 - 0.0013i 0.0044 - 0.0066i -0.0548 - 0.0072i -0.0061 + 0.0073i
-0.1182 - 0.0062i -1.0999 - 0.0472i 0.0699 + 0.0360i 0.0122 - 0.0125i -0.0264 - 0.0522i 0.0138 - 0.0346i
0.0271 + 0.0174i 0.0189 + 0.3787i -0.8585 + 0.2630i 0.0025 + 0.0043i 0.1175 + 0.0438i -0.0038 - 0.0057i
-0.0006 + 0.0003i -0.0065 + 0.0032i -0.0078 + 0.0026i 0.0455 + 0.0011i 0.0570 - 0.0028i -0.0044 + 0.0021i

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

0.0330 - 0.0156i	-0.0896 + 0.0296i	0.0556 + 0.0680i	0.1010 - 0.0120i	0.7167 - 0.0793i	0.0084 + 0.0122i
-0.0161 - 0.0009i	0.0453 - 0.0556i	-0.0161 - 0.0128i	-0.0319 + 0.0059i	-0.1586 + 0.0150i	0.3082 - 0.0068i
0.0268 + 0.0315i	0.0537 + 0.0217i	-0.0227 + 0.0050i	0.0265 - 0.0067i	-0.0746 + 0.1758i	0.0150 - 0.0086i
0.0338 + 0.0355i	0.1197 + 0.3014i	-0.1268 - 0.0969i	0.0285 + 0.0011i	-0.1169 + 0.1809i	0.0214 - 0.0401i
-0.0036 - 0.0100i	0.0036 - 0.0620i	0.0017 + 0.0233i	-0.0108 - 0.0135i	0.0708 - 0.0996i	-0.0642 + 0.0160i
0.0526 - 0.0011i	-0.0046 + 0.0005i	-0.0085 + 0.0201i	0.0118 - 0.0062i	0.0554 + 0.0214i	-0.0055 - 0.0050i
-0.0403 + 0.0034i	0.2259 + 0.1161i	-0.2151 + 0.0227i	-0.0148 - 0.0066i	-0.0579 - 0.0192i	0.0114 - 0.0146i
0.0115 - 0.0165i	0.0341 - 0.1042i	0.0047 + 0.0237i	0.0168 + 0.0017i	0.0501 + 0.0143i	-0.0165 + 0.0021i

Columns 13 through 18

-0.0277 - 0.0164i	-0.0120 - 0.0045i	0.0171 - 0.0026i	-0.0200 - 0.0055i	-0.0042 + 0.0023i	-0.0093 + 0.0008i
0.2080 + 0.2325i	-0.0792 + 0.0164i	0.0737 - 0.0858i	-0.0274 + 0.0443i	0.0422 - 0.0389i	-0.0839 - 0.0728i
0.4358 + 0.5690i	-0.3777 - 0.0628i	0.1308 - 0.1992i	-0.1228 + 0.1151i	0.0805 - 0.1809i	-0.1680 - 0.2015i
-0.0568 - 0.0276i	-0.0481 + 0.0184i	-0.0036 - 0.0277i	-0.0646 - 0.0611i	-0.0756 - 0.0336i	0.0300 + 0.0025i
0.1531 + 0.0363i	-0.0996 - 0.0301i	0.1985 - 0.0735i	-0.0301 + 0.0243i	0.0919 + 0.1104i	-0.0627 - 0.0287i
-0.1301 + 0.0001i	0.0037 - 0.0234i	-0.0048 + 0.0125i	-0.0009 - 0.0233i	-0.0187 + 0.0077i	0.0468 - 0.0037i
0.0842 - 0.0482i	0.0434 + 0.0193i	-0.0057 - 0.0103i	0.0652 - 0.0002i	0.0910 + 0.0120i	-0.0488 + 0.0127i
-0.0139 + 0.0203i	-0.1096 + 0.0797i	0.0591 - 0.0159i	-0.1385 - 0.0125i	0.1576 + 0.0536i	-0.2481 + 0.0259i
0.0233 - 0.0560i	0.0804 + 0.0105i	-0.0110 + 0.0058i	0.0296 + 0.0051i	0.0210 - 0.0486i	0.0184 + 0.0578i
-0.0047 - 0.0035i	0.0166 + 0.0001i	0.0046 + 0.0138i	-0.0077 + 0.0034i	-0.0028 + 0.0101i	-0.0006 + 0.0054i
-0.1172 - 0.1584i	0.0538 - 0.0509i	-0.0296 + 0.0373i	0.0500 - 0.0426i	0.0207 + 0.0185i	0.0314 + 0.0707i
0.0175 + 0.0756i	0.0084 + 0.0351i	-0.1043 - 0.0443i	-0.0029 + 0.0155i	-0.0159 + 0.0180i	-0.0143 - 0.0307i
0.3388 - 0.0194i	-0.1092 + 0.0284i	0.0008 + 0.0099i	0.0931 + 0.0872i	-0.0187 - 0.0207i	-0.0228 - 0.0019i
-0.2052 - 0.0192i	-0.9136 + 0.0381i	-0.1402 + 0.1001i	0.0686 + 0.0404i	-0.0876 - 0.1642i	0.1308 + 0.0647i
0.0189 + 0.0133i	0.0493 + 0.1435i	-0.8968 + 0.3329i	-0.0043 + 0.0066i	0.0119 - 0.0413i	-0.0837 + 0.1472i
0.0732 - 0.0890i	-0.0004 + 0.0164i	-0.0022 - 0.0363i	0.2398 - 0.0036i	-0.1268 - 0.0011i	0.0053 + 0.0363i
0.0681 + 0.0010i	-0.0742 + 0.0434i	0.0395 - 0.1016i	-0.2346 + 0.0173i	-0.9675 - 0.0098i	-0.0424 + 0.0980i
-0.0698 - 0.0222i	-0.0250 - 0.0448i	0.1402 + 0.0478i	0.0532 - 0.0170i	0.0412 + 0.1853i	-0.9533 + 0.2091i

SG.S21 =

Columns 1 through 6

0.0420 - 0.0020i	0.1047 - 0.0213i	0.2271 - 0.0454i	0.0148 + 0.0075i	0.0179 - 0.0023i	0.0216 - 0.0159i
0.1218 - 0.0066i	1.5861 - 0.1963i	3.0145 - 0.4969i	-0.0624 - 0.1215i	-0.1892 - 0.1668i	0.1514 - 0.1432i
0.2411 - 0.0481i	4.2182 - 0.7145i	10.0658 - 1.8093i	-0.0860 - 0.2993i	-0.5276 - 0.2758i	0.4757 - 0.6314i
-0.0027 - 0.0078i	-0.1228 - 0.0916i	-0.3330 - 0.2116i	0.0991 + 0.0102i	-0.1544 + 0.0372i	-0.0210 - 0.0016i
0.0325 - 0.0109i	0.2259 - 0.0484i	0.7353 - 0.3922i	-0.0933 - 0.0304i	-1.0461 - 0.0257i	0.0660 - 0.0447i
-0.0322 + 0.0363i	-0.2856 + 0.5677i	-0.6173 + 1.6543i	0.0521 + 0.0286i	0.0873 + 0.2256i	-0.7959 + 0.4363i
-0.0001 + 0.0059i	0.0981 - 0.0039i	0.2326 - 0.0090i	0.0064 - 0.0088i	0.0639 - 0.0371i	-0.0046 - 0.0027i
-0.0086 + 0.0142i	0.0068 + 0.0774i	0.0529 + 0.2957i	0.0480 - 0.0200i	0.0672 - 0.0364i	-0.0396 - 0.0103i
0.0039 - 0.0109i	-0.2683 - 0.0708i	-0.6765 - 0.2144i	-0.0244 + 0.0112i	-0.0798 - 0.2002i	0.2590 + 0.0946i
-0.0218 - 0.0009i	-0.0923 + 0.0023i	-0.1119 - 0.0048i	0.0047 + 0.0057i	0.0145 + 0.0031i	0.0074 + 0.0086i
-0.0773 + 0.0115i	-1.2509 + 0.1690i	-2.7898 + 0.4338i	0.0152 + 0.0690i	0.0879 - 0.0051i	-0.1451 + 0.1535i
0.0227 - 0.0061i	0.4834 - 0.0385i	0.8953 - 0.1150i	0.0123 - 0.0384i	0.0291 + 0.0655i	0.0535 - 0.0618i
-0.0144 + 0.0008i	0.1118 - 0.3377i	0.0886 - 0.7040i	-0.0770 - 0.0005i	-0.0120 + 0.0267i	-0.0203 - 0.0512i
-0.0121 - 0.0052i	0.1646 - 0.2832i	0.1187 - 0.4079i	0.0212 - 0.0099i	-0.1606 - 0.0861i	0.2051 - 0.0535i
0.0054 + 0.0129i	-0.1237 + 0.1855i	-0.2154 + 0.3781i	0.0024 + 0.0117i	-0.0307 + 0.0374i	-0.0015 + 0.0140i
-0.0067 + 0.0045i	-0.1214 - 0.0372i	-0.2847 - 0.0462i	-0.0229 + 0.0258i	-0.0486 + 0.0435i	-0.0163 - 0.0034i
0.0165 + 0.0029i	0.1383 + 0.0665i	0.3047 + 0.1523i	-0.0398 + 0.0031i	-0.2446 + 0.1026i	0.1686 - 0.0926i
-0.0143 - 0.0040i	-0.0921 - 0.0484i	-0.2087 - 0.0926i	0.0196 + 0.0179i	0.0846 + 0.0382i	-0.0418 - 0.0067i

Columns 7 through 12

-0.0048 - 0.0004i	0.0019 + 0.0024i	-0.0105 - 0.0085i	-0.0243 + 0.0020i	-0.0420 + 0.0095i	0.0038 - 0.0008i
-0.0398 + 0.0277i	0.0278 - 0.0054i	-0.0359 - 0.0879i	-0.1313 + 0.0085i	-0.7009 + 0.0921i	0.0904 - 0.0109i
-0.1209 + 0.0654i	0.1911 - 0.0004i	-0.2463 - 0.2678i	-0.2996 + 0.0562i	-1.9620 + 0.3356i	0.2430 - 0.0463i
0.0111 + 0.0021i	0.0699 + 0.0399i	-0.0081 + 0.0098i	0.0095 + 0.0032i	0.0442 + 0.0621i	0.0067 - 0.0016i
0.0165 + 0.0276i	0.0363 + 0.0453i	-0.0202 - 0.0469i	-0.0326 + 0.0117i	-0.1193 + 0.0480i	0.0649 - 0.0333i
0.0065 - 0.0280i	0.1312 - 0.1182i	-0.0118 + 0.2703i	0.0330 - 0.0390i	0.1441 - 0.2607i	-0.0166 + 0.0403i
0.0950 - 0.0009i	-0.1555 - 0.0364i	0.0157 - 0.0013i	0.0044 - 0.0066i	-0.0548 - 0.0072i	-0.0061 + 0.0073i
-0.1182 - 0.0062i	-1.0999 - 0.0472i	0.0699 + 0.0360i	0.0122 - 0.0125i	-0.0264 - 0.0522i	0.0138 + 0.0346i
0.0271 + 0.0174i	0.0189 + 0.3787i	-0.8585 + 0.2630i	0.0025 + 0.0043i	0.1175 + 0.0438i	-0.0038 - 0.0057i
-0.0006 + 0.0003i	-0.0065 + 0.0032i	-0.0078 + 0.0026i	0.0455 + 0.0011i	0.0570 - 0.0028i	-0.0044 + 0.0021i
0.0330 - 0.0156i	-0.0896 + 0.0296i	0.0556 + 0.0680i	0.1010 - 0.0120i	0.7167 - 0.0793i	0.0084 + 0.0122i
-0.0161 - 0.0009i	0.0453 - 0.0556i	-0.0161 - 0.0128i	-0.0319 + 0.0059i	-0.1586 + 0.0150i	0.3082 - 0.0068i
0.0268 + 0.0315i	0.0537 + 0.0217i	-0.0227 + 0.0050i	0.0265 - 0.0067i	-0.0746 + 0.1758i	0.0150 - 0.0086i
0.0338 + 0.0355i	0.1197 + 0.3014i	-0.1268 - 0.0969i	0.0285 + 0.0011i	-0.1169 + 0.1809i	0.0214 - 0.0401i
-0.0036 - 0.0100i	0.0036 - 0.0620i	0.0017 + 0.0233i	-0.0108 - 0.0135i	0.0708 - 0.0996i	-0.0642 + 0.0160i
0.0526 - 0.0011i	-0.0046 + 0.0005i	-0.0085 + 0.0201i	0.0118 - 0.0062i	0.0554 + 0.0214i	-0.0055 - 0.0050i
-0.0403 + 0.0034i	0.2259 + 0.1161i	-0.2151 + 0.0227i	-0.0148 - 0.0066i	-0.0579 - 0.0192i	0.0114 - 0.0146i
0.0115 - 0.0165i	0.0341 - 0.1042i	0.0047 + 0.0237i	0.0168 + 0.0017i	0.0501 + 0.0143i	-0.0165 + 0.0021i

Columns 13 through 18

-0.0277 - 0.0164i	-0.0120 - 0.0045i	0.0171 - 0.0026i	-0.0200 - 0.0055i	-0.0042 + 0.0023i	-0.0093 + 0.0008i
0.2080 + 0.2325i	-0.0792 + 0.0164i	0.0737 - 0.0858i	-0.0274 + 0.0443i	0.0422 - 0.0389i	-0.0839 - 0.0728i
0.4358 + 0.5690i	-0.3777 - 0.0628i	0.1308 - 0.1992i	-0.1228 + 0.1151i	0.0805 - 0.1809i	-0.1680 - 0.2015i
-0.0568 - 0.0276i	-0.0481 + 0.0184i	-0.0036 - 0.0277i	-0.0646 - 0.0611i	-0.0756 - 0.0336i	0.0300 + 0.0025i
0.1531 + 0.0363i	-0.0996 - 0.0301i	0.1985 - 0.0735i	-0.0301 + 0.0243i	0.0919 + 0.1104i	-0.0627 - 0.0287i
-0.1301 + 0.0001i	0.0037 - 0.0234i	-0.0048 + 0.0125i	-0.0009 - 0.0233i	-0.0187 + 0.0077i	0.0468 - 0.0037i
0.0842 - 0.0482i	0.0434 + 0.0193i	-0.0057 - 0.0103i	0.0652 - 0.0002i	0.0910 + 0.0120i	-0.0488 + 0.0127i
-0.0139 + 0.0203i	-0.1096 + 0.0797i	0.0591 - 0.0159i	-0.1385 - 0.0125i	0.1576 + 0.0536i	-0.2481 + 0.0259i
0.0233 - 0.0560i	0.0804 + 0.0105i	-0.0110 + 0.0058i	0.0296 + 0.0051i	0.0210 - 0.0486i	0.0184 + 0.0578i
-0.0047 - 0.0035i	0.0166 + 0.0001i	0.0046 + 0.0138i	-0.0077 + 0.0034i	-0.0028 + 0.0101i	-0.0006 + 0.0054i
-0.1172 - 0.1584i	0.0538 - 0.0509i	-0.0296 + 0.0373i	0.0500 - 0.0426i	0.0207 + 0.0185i	0.0314 + 0.0707i
0.0175 + 0.0756i	0.0084 + 0.0351i	-0.1043 - 0.0443i	-0.0029 + 0.0155i	-0.0159 + 0.0180i	-0.0143 - 0.0307i
0.3388 - 0.0194i	-0.1092 + 0.0284i	0.0008 + 0.0099i	0.0931 + 0.0872i	-0.0187 - 0.0207i	-0.0228 - 0.0019i
-0.2052 - 0.0192i	-0.9136 + 0.0381i	-0.1402 + 0.1001i	0.0686 + 0.0404i	-0.0876 - 0.1642i	0.1308 + 0.0647i
0.0189 + 0.0133i	0.0493 + 0.1435i	-0.8968 + 0.3329i	-0.0043 + 0.0066i	0.0119 - 0.0413i	-0.0837 + 0.1472i
0.0732 - 0.0890i	-0.0004 + 0.0164i	-0.0022 - 0.0363i	0.2398 - 0.0036i	-0.1268 - 0.0011i	0.0053 + 0.0363i
0.0681 + 0.0010i	-0.0742 + 0.0434i	0.0395 - 0.1016i	-0.2346 + 0.0173i	-0.9675 - 0.0098i	-0.0424 + 0.0980i
-0.0698 - 0.0222i	-0.0250 - 0.0448i	0.1402 + 0.0478i	0.0532 - 0.0170i	0.0412 + 0.1853i	-0.9533 + 0.2091i

SG.S22 =

Columns 1 through 6

-0.3293 - 0.0021i	0.0776 - 0.0198i	0.2408 - 0.0412i	-0.0150 - 0.0215i	0.0126 + 0.0149i	0.0026 - 0.0087i
0.1285 - 0.0092i	1.5376 - 0.1978i	3.0757 - 0.4910i	-0.0423 - 0.0953i	-0.1283 - 0.0371i	0.1242 - 0.1572i
0.2370 - 0.0461i	4.2838 - 0.7082i	10.3487 - 1.8322i	-0.0819 - 0.3042i	-0.5565 - 0.3260i	0.5729 - 0.5700i
-0.0244 + 0.0167i	-0.0973 - 0.1187i	-0.3325 - 0.2127i	-0.7550 + 0.0114i	0.0266 + 0.0151i	-0.0432 + 0.0028i
0.0164 - 0.0044i	0.2434 - 0.0897i	0.7979 - 0.4038i	-0.0008 - 0.0180i	0.0373 + 0.0089i	-0.0152 - 0.0072i
-0.0010 + 0.0169i	-0.2249 + 0.6325i	-0.8946 + 1.5272i	0.0545 + 0.0043i	0.0263 - 0.3178i	-0.1352 - 0.0918i



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

-0.0113 - 0.0023i 0.1039 + 0.0069i 0.2292 - 0.0036i -0.0744 + 0.0542i -0.0574 - 0.0027i 0.0235 - 0.0101i
0.0097 - 0.0028i -0.0295 + 0.1117i 0.0533 + 0.2935i 0.0131 - 0.0049i -0.1360 + 0.0868i 0.0495 - 0.0093i
-0.0242 + 0.0082i -0.2483 - 0.0751i -0.6401 - 0.2553i -0.0049 + 0.0226i 0.1704 + 0.2451i -0.2996 - 0.0037i
-0.4743 - 0.0001i -0.1543 + 0.0021i -0.0953 - 0.0034i -0.0254 - 0.0273i 0.0376 + 0.0296i -0.0082 + 0.0190i
-0.1319 + 0.0092i -1.7908 + 0.1706i -2.8089 + 0.4333i 0.0603 + 0.1184i 0.1123 + 0.0745i -0.1217 + 0.1303i
0.0304 - 0.0045i 0.3745 - 0.0427i 0.9804 - 0.1199i -0.0240 - 0.0215i -0.0665 - 0.0630i 0.0485 - 0.0425i
-0.0311 + 0.0225i 0.1269 - 0.3474i 0.0937 - 0.7096i -0.3813 + 0.0002i 0.0097 + 0.0284i -0.0317 - 0.0511i
0.0209 - 0.0312i 0.0640 - 0.1613i 0.2666 - 0.4318i 0.0089 + 0.0082i 0.2015 + 0.1224i -0.2187 - 0.0247i
-0.0166 + 0.0187i -0.1184 + 0.1770i -0.2525 + 0.3449i 0.0027 - 0.0030i -0.0449 - 0.0559i 0.0077 + 0.0438i
-0.0069 - 0.0090i -0.1208 - 0.0446i -0.2285 - 0.0517i -0.0018 + 0.0113i -0.0126 + 0.0280i -0.0201 + 0.0084i
-0.0003 + 0.0075i 0.1665 + 0.0685i 0.3405 + 0.1163i 0.0104 - 0.0089i 0.1798 - 0.0849i -0.1251 + 0.0726i
-0.0008 - 0.0041i -0.1108 - 0.0597i -0.2103 - 0.0842i 0.0011 + 0.0049i -0.0359 - 0.0475i 0.0089 + 0.0158i

Columns 7 through 12

-0.0226 + 0.0063i 0.0082 - 0.0121i 0.0010 - 0.0069i -0.4780 + 0.0025i -0.0963 + 0.0131i 0.0255 - 0.0048i
-0.0281 + 0.0207i 0.1223 - 0.0199i -0.0672 - 0.0724i -0.1758 + 0.0086i -1.2219 + 0.0943i -0.0042 - 0.0145i
-0.1275 + 0.0647i 0.1459 - 0.0160i -0.1703 - 0.3013i -0.3002 + 0.0552i -1.9915 + 0.3296i 0.3072 - 0.0457i
-0.0671 - 0.0655i -0.0611 - 0.0335i 0.0137 + 0.0260i -0.0206 + 0.0302i 0.0918 + 0.0138i -0.0432 - 0.0136i
0.0091 + 0.0182i -0.0658 - 0.1043i -0.0042 - 0.0261i -0.0038 - 0.0034i -0.1119 + 0.0273i -0.0112 + 0.0010i
-0.0191 - 0.0140i -0.1333 + 0.1710i 0.0840 - 0.2163i 0.0066 - 0.0357i 0.0906 - 0.2935i -0.0237 + 0.0408i
-0.7087 + 0.0027i 0.0533 + 0.0237i -0.0209 - 0.0164i -0.0019 - 0.0075i -0.0390 + 0.0130i 0.0204 - 0.0082i
0.0195 - 0.0024i 0.1635 + 0.0600i -0.0542 + 0.0283i -0.0134 + 0.0030i 0.0297 - 0.0402i -0.0042 - 0.0142i
0.0166 - 0.0154i -0.0811 - 0.3862i -0.1322 - 0.1704i 0.0289 + 0.0022i 0.1219 + 0.0207i -0.0307 - 0.0060i
-0.0142 + 0.0078i 0.0022 - 0.0075i 0.0077 - 0.0028i -0.2135 + 0.0008i 0.0291 + 0.0005i 0.0139 - 0.0023i
0.0488 - 0.0341i -0.0209 - 0.0094i 0.0422 + 0.0804i 0.0821 - 0.0144i -0.0026 - 0.0793i -0.1896 + 0.0095i
-0.0041 + 0.0146i -0.0257 + 0.0614i -0.0182 - 0.0369i -0.0138 + 0.0090i -0.3117 + 0.0197i -1.0511 + 0.0034i
0.0124 + 0.0214i 0.0368 - 0.0036i -0.0202 + 0.0224i 0.0352 - 0.0196i -0.0658 + 0.1608i 0.0011 - 0.0203i
0.0006 + 0.0001i -0.0779 - 0.2534i 0.0985 + 0.0983i -0.0217 + 0.0337i -0.0230 + 0.0668i 0.0185 - 0.0047i
-0.0169 + 0.0051i -0.0471 + 0.0365i 0.0190 - 0.0160i 0.0136 - 0.0277i 0.0679 - 0.0945i 0.0245 + 0.0415i
0.3868 - 0.0019i -0.0546 - 0.0180i 0.0152 + 0.0218i 0.0228 - 0.0064i 0.0477 + 0.0164i -0.0120 + 0.0037i
-0.0447 - 0.0011i -0.3166 - 0.1210i 0.2146 - 0.0182i -0.0063 - 0.0085i -0.0967 - 0.0485i 0.0113 + 0.0302i
0.0214 + 0.0093i 0.0752 + 0.0938i -0.0030 - 0.0107i 0.0005 + 0.0080i 0.0515 + 0.0428i -0.0014 - 0.0141i

Columns 13 through 18

-0.0599 - 0.0479i 0.0184 + 0.0173i 0.0045 + 0.0140i -0.0298 - 0.0045i 0.0070 - 0.0016i 0.0024 - 0.0101i
0.2259 + 0.2340i -0.0869 + 0.0219i 0.0729 - 0.0941i -0.0256 + 0.0522i -0.0092 - 0.0456i -0.0444 - 0.0849i
0.4389 + 0.5792i -0.3846 - 0.0713i 0.1454 - 0.1953i -0.1292 + 0.1121i 0.0827 - 0.1675i -0.1727 - 0.2085i
-0.3602 - 0.0269i 0.0059 + 0.0076i -0.0278 - 0.0050i -0.0431 - 0.0551i 0.0148 + 0.0182i -0.0240 + 0.0283i
0.0116 + 0.0390i 0.1062 + 0.0428i -0.1781 + 0.0499i 0.0574 + 0.0458i -0.0113 - 0.0690i 0.0185 + 0.0165i
-0.1213 + 0.0251i 0.0094 - 0.0624i 0.0320 + 0.0524i -0.0374 - 0.0351i -0.0080 + 0.0141i 0.0275 + 0.0086i
0.0732 - 0.0412i -0.0155 - 0.0009i 0.0263 - 0.0126i 0.4128 + 0.0027i -0.0325 - 0.0180i 0.0285 + 0.0132i
-0.0716 + 0.0315i 0.0358 - 0.0429i -0.0730 + 0.0127i -0.0079 - 0.0013i -0.2718 - 0.0553i 0.2640 - 0.0220i
-0.0018 - 0.0383i 0.0157 - 0.0064i -0.0188 + 0.0024i 0.0403 - 0.0007i 0.0672 + 0.0632i -0.0134 - 0.0326i
-0.0151 - 0.0072i 0.0153 + 0.0088i -0.0106 + 0.0040i -0.0080 + 0.0058i 0.0015 - 0.0019i 0.0065 + 0.0041i
-0.1063 - 0.1562i 0.0824 + 0.0123i -0.0381 + 0.0452i 0.0466 - 0.0392i -0.0284 + 0.0484i 0.0611 + 0.0402i
0.0082 + 0.0558i -0.0611 - 0.0396i 0.0544 + 0.0743i -0.0211 + 0.0114i 0.0160 - 0.0393i 0.0026 + 0.0205i
0.4917 - 0.0208i 0.0033 + 0.0237i -0.0058 + 0.0213i 0.1201 + 0.1171i -0.0347 - 0.0132i -0.0358 - 0.0365i
-0.0073 - 0.0188i -0.1043 - 0.0151i 0.1367 + 0.0321i 0.0383 + 0.0257i 0.0918 + 0.1850i -0.0834 - 0.1238i
0.0176 + 0.0027i -0.0177 - 0.1672i -0.0873 - 0.2102i -0.0643 + 0.0054i -0.0246 + 0.0280i 0.0190 - 0.0640i
0.0978 - 0.1198i -0.0097 + 0.0184i 0.0057 - 0.0025i 0.3548 - 0.0063i 0.0037 + 0.0049i -0.0171 + 0.0386i
0.0535 + 0.0151i 0.0708 - 0.0766i -0.0830 + 0.0320i -0.0589 + 0.0022i -0.0521 - 0.0044i 0.0400 + 0.0638i
-0.0168 - 0.0467i 0.0199 + 0.0731i -0.0626 + 0.0124i 0.0533 - 0.0193i -0.0263 - 0.1762i -0.0354 - 0.1136i

LAYER 2...

P =

Columns 1 through 13

0.7146 0 0 0 0 0 0 0 0 0 0.1908 0 0 0
0 0.3440 0 0 0 0 0 0 0 0 0 0.8125 0 0
0 0 -0.0267 0 0 0 0 0 0 0 0 0 0.9989 0
0 0 0 0.2249 0 0 0 0 0 0 0 0 0 0.1908
0 0 0 0 0.1083 0 0 0 0 0 0 0 0 0
0 0 0 0 0 -0.0084 0 0 0 0 0 0 0 0
0 0 0 0 0 0 -0.2648 0 0 0 0 0 0 0
0 0 0 0 0 0 0 -0.1274 0 0 0 0 0 0
-0.3690 0 0 0 0 0 0 0 0.0099 0 0 -0.7146 0 0
0 -0.3690 0 0 0 0 0 0 0 0 -0.3440 0 0 0
0 0 -0.3690 0 0 0 0 0 0 0 0 0 0.0267 0
0 0 0 -0.9375 0 0 0 0 0 0 0 0 0 -0.2249
0 0 0 0 -0.9375 0 0 0 0 0 0 0 0 0
0 0 0 0 0 -0.9375 0 0 0 0 0 0 0 0
0 0 0 0 0 0 -0.9134 0 0 0 0 0 0 0
0 0 0 0 0 0 0 -0.9134 0 0 0 0 0 0
0 0 0 0 0 0 0 0 -0.9134 0 0 0 0 0

Columns 14 through 18

0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0.8125 0 0 0 0
0 0.9989 0 0 0
0 0 0.1908 0 0
0 0 0 0.8125 0
0 0 0 0 0.9989
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
-0.1083 0 0 0 0
0 0.0084 0 0 0
0 0 0.2648 0 0
0 0 0 0.1274 0
0 0 0 0 -0.0099

Q =

Columns 1 through 13



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

Table with numerical values in a grid format, representing spatial harmonics data.

Columns 14 through 18

Table with numerical values in a grid format, representing spatial harmonics data.

OMEGA_SQ =

Columns 1 through 13

Table with numerical values in a grid format, representing OMEGA_SQ data.

Columns 14 through 18

Table with numerical values in a grid format, representing spatial harmonics data.

W =

Columns 1 through 6

Table with complex numerical values in a grid format, representing W data.



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

Table with 6 columns of complex numbers (real and imaginary parts) representing spatial harmonics.

S.S12 =
Columns 1 through 6

Table with 6 columns of complex numbers, corresponding to S.S12 columns 1 through 6.

Columns 7 through 12

Table with 6 columns of complex numbers, corresponding to columns 7 through 12.

Columns 13 through 18

Table with 6 columns of complex numbers, corresponding to columns 13 through 18.

S.S21 =
Columns 1 through 6

Table with 6 columns of complex numbers, corresponding to S.S21 columns 1 through 6.

Columns 7 through 12

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)



0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	0.0000 + 0.0000i	-0.3721 + 0.2326i
SG.S11 =						
Columns 1 through 6						
-0.3327 - 0.0026i	-0.0109 - 0.0130i	0.0156 + 0.0032i	-0.0061 - 0.0126i	0.0994 + 0.0200i	-0.0067 - 0.0026i	
0.0818 + 0.0086i	0.4989 - 0.0413i	0.0417 - 0.0129i	-0.0367 - 0.0317i	0.1289 + 0.0168i	-0.0390 + 0.1074i	
-0.0075 - 0.0010i	0.0604 - 0.0154i	0.3212 - 0.0181i	0.0085 + 0.0036i	0.0509 + 0.0129i	0.0215 + 0.0585i	
-0.0121 + 0.0240i	-0.0217 + 0.0636i	-0.0334 + 0.0010i	-0.7977 + 0.0015i	-0.3848 + 0.0644i	0.0231 + 0.0257i	
-0.0298 + 0.0305i	-0.5188 + 0.4380i	-0.1189 + 0.0026i	-0.0855 + 0.0067i	-2.6246 + 0.2204i	0.1388 + 0.1720i	
0.0180 - 0.0348i	0.1163 - 0.1931i	-0.0718 - 0.1374i	-0.0258 + 0.0220i	-0.2873 + 0.2177i	-0.4047 + 0.3777i	
-0.0187 - 0.0013i	-0.0058 - 0.0166i	0.0178 + 0.0031i	-0.0864 + 0.0836i	0.0833 - 0.0556i	-0.0219 - 0.0194i	
-0.0190 - 0.0043i	-0.1683 + 0.0269i	-0.0220 + 0.0590i	0.0763 - 0.0213i	-0.5261 + 0.5036i	-0.0215 - 0.1198i	
0.0054 + 0.0068i	0.0549 + 0.0279i	0.0174 - 0.0524i	-0.0054 - 0.0178i	0.2064 + 0.0906i	0.1092 - 0.0755i	
-0.4776 - 0.0008i	-0.1372 + 0.0141i	0.0185 + 0.0025i	-0.0195 - 0.0325i	0.0495 + 0.0131i	-0.0018 - 0.0105i	
-0.0817 - 0.0073i	-0.6548 + 0.0039i	-0.0804 - 0.0188i	0.0751 + 0.0114i	-0.3285 - 0.2266i	0.0214 - 0.0077i	
0.0421 - 0.0021i	0.4350 + 0.0278i	0.0053 + 0.0024i	-0.0051 - 0.0671i	0.2298 + 0.2717i	0.0050 + 0.0242i	
-0.0299 + 0.0444i	0.2113 - 0.1271i	-0.0169 - 0.0075i	-0.4178 + 0.0027i	0.1486 - 0.0318i	0.0229 + 0.0160i	
0.0056 - 0.0272i	-0.0304 - 0.0894i	-0.0739 + 0.0186i	0.0463 + 0.0258i	-0.7760 + 0.1204i	0.0871 + 0.0516i	
-0.0151 + 0.0215i	-0.0852 + 0.1340i	-0.0066 + 0.0001i	-0.0185 - 0.0041i	-0.3505 + 0.2505i	-0.0109 + 0.0006i	
0.0014 + 0.0160i	-0.0004 - 0.0484i	-0.0118 + 0.0056i	-0.0326 + 0.0222i	-0.1458 + 0.0470i	0.0167 - 0.0086i	
0.0130 + 0.0074i	0.1239 + 0.0428i	0.0104 - 0.0173i	-0.0686 + 0.0073i	0.0539 + 0.0132i	-0.0157 + 0.0306i	
-0.0012 - 0.0081i	-0.0597 - 0.0721i	-0.0023 - 0.0072i	0.0283 + 0.0175i	0.0538 - 0.1706i	0.0055 + 0.0004i	
Columns 7 through 12						
-0.0257 - 0.0005i	0.0098 - 0.0109i	0.0020 + 0.0004i	-0.4768 + 0.0027i	-0.0544 + 0.0089i	0.0220 - 0.0013i	
0.0125 + 0.0190i	0.1160 - 0.0088i	0.0473 + 0.0354i	-0.1099 - 0.0134i	-0.7651 + 0.0195i	-0.0289 + 0.0010i	
-0.0036 - 0.0029i	0.0121 + 0.0221i	0.0154 + 0.0265i	0.0006 + 0.0016i	-0.0263 + 0.0056i	0.0394 + 0.0032i	
-0.0802 - 0.0846i	0.0056 + 0.0104i	-0.0093 - 0.0165i	-0.0359 + 0.0245i	0.0793 - 0.0476i	-0.0155 + 0.0234i	
0.0807 + 0.0338i	-0.4712 - 0.2578i	-0.0080 - 0.0841i	0.0725 - 0.0438i	0.1971 - 0.1508i	0.0848 - 0.0987i	
0.0103 - 0.0084i	0.0283 - 0.0516i	0.0369 + 0.1262i	-0.0136 + 0.0251i	-0.0609 + 0.1438i	-0.0129 + 0.0165i	
-0.7463 - 0.0036i	-0.1856 - 0.0234i	0.0108 + 0.0199i	0.0037 - 0.0056i	0.0035 + 0.0099i	-0.0176 + 0.0076i	
-0.1431 - 0.0117i	-1.7001 + 0.0838i	0.0377 + 0.1669i	0.0222 + 0.0096i	0.0718 + 0.0005i	0.0300 - 0.0162i	
0.0039 + 0.0167i	-0.1411 + 0.1331i	-0.5651 + 0.3524i	-0.0052 - 0.0041i	-0.0378 - 0.0306i	-0.0078 + 0.0013i	
-0.0208 + 0.0082i	-0.0123 + 0.0006i	-0.0036 - 0.0059i	-0.2132 + 0.0021i	0.0227 - 0.0057i	0.0301 + 0.0013i	
0.0060 - 0.0042i	-0.1238 + 0.0124i	-0.0022 - 0.0171i	0.0164 + 0.0072i	-0.4951 + 0.0036i	0.2033 - 0.0067i	
-0.0130 + 0.0119i	0.0173 + 0.0917i	0.0143 + 0.0252i	-0.0171 + 0.0041i	-0.0764 - 0.0082i	-0.4173 + 0.0116i	
0.0488 + 0.0358i	0.1802 + 0.0346i	0.0139 + 0.0072i	0.0422 - 0.0496i	-0.1005 + 0.0818i	0.0044 + 0.0505i	
0.0669 + 0.0275i	-0.0987 + 0.0279i	0.0085 - 0.0194i	0.0201 + 0.0187i	-0.0197 + 0.1026i	0.0797 - 0.0672i	
-0.0122 + 0.0020i	-0.1206 - 0.0310i	-0.0218 + 0.0057i	0.0104 - 0.0278i	0.0253 - 0.0623i	-0.0554 + 0.0289i	
0.4159 - 0.0049i	-0.0391 - 0.0513i	-0.0028 + 0.0134i	0.0164 - 0.0176i	-0.0080 + 0.0303i	-0.0004 + 0.0107i	
-0.0812 + 0.0086i	0.3625 - 0.0524i	-0.0184 + 0.0091i	-0.0153 - 0.0091i	-0.0544 - 0.0064i	-0.0035 + 0.0478i	
0.0322 - 0.0120i	0.1969 - 0.1604i	0.0252 - 0.0289i	-0.0031 + 0.0108i	0.0250 + 0.0353i	-0.0062 - 0.0092i	
Columns 13 through 18						
-0.0929 - 0.0763i	0.0582 + 0.0149i	-0.0070 + 0.0049i	-0.0351 - 0.0153i	-0.0078 + 0.0099i	0.0111 + 0.0013i	
0.2214 + 0.1611i	0.1494 + 0.1446i	0.0285 + 0.0656i	0.0231 + 0.0584i	-0.0724 + 0.0096i	-0.0291 - 0.0353i	
0.0007 - 0.0025i	0.0302 + 0.0035i	-0.0047 - 0.0094i	-0.0012 - 0.0097i	-0.0052 - 0.0316i	0.0012 + 0.0051i	
-0.4533 + 0.0016i	-0.1904 + 0.0259i	0.0179 - 0.0087i	-0.0649 - 0.0638i	-0.0137 + 0.0043i	-0.0027 + 0.0187i	
-0.1206 - 0.0237i	-1.0776 + 0.0961i	0.2195 + 0.1953i	0.1003 + 0.0716i	0.4375 + 0.3575i	0.0418 - 0.0676i	
0.0365 - 0.0134i	-0.1782 + 0.1474i	0.0043 - 0.0112i	-0.0050 + 0.0010i	-0.0622 - 0.0104i	-0.0083 + 0.0194i	
0.0935 - 0.0793i	0.0614 - 0.0198i	0.0228 - 0.0099i	0.4694 - 0.0122i	0.0783 - 0.0114i	-0.0193 + 0.0214i	
-0.1912 + 0.0578i	-0.3973 + 0.3017i	0.0445 + 0.0194i	-0.2071 - 0.0323i	0.3751 - 0.0445i	-0.0887 - 0.0549i	
0.0614 + 0.0098i	0.1603 - 0.0068i	-0.0205 - 0.0000i	0.0599 + 0.0110i	0.2136 - 0.1178i	-0.0059 - 0.0305i	
-0.0271 - 0.0038i	0.0206 - 0.0124i	-0.0098 + 0.0077i	-0.0176 + 0.0097i	0.0065 + 0.0029i	0.0101 + 0.0045i	
-0.0778 - 0.0282i	-0.2455 - 0.2031i	-0.0669 + 0.0402i	0.0108 - 0.0080i	0.0662 + 0.0299i	0.0396 - 0.0053i	
-0.0112 + 0.1320i	0.1097 + 0.1351i	-0.1326 + 0.0151i	0.0040 + 0.0533i	-0.0596 - 0.0285i	0.0217 + 0.0370i	
0.6078 - 0.0096i	-0.0381 + 0.0082i	0.0182 + 0.0247i	0.2330 + 0.1938i	-0.0947 - 0.0254i	-0.0277 - 0.0309i	
-0.4044 - 0.1058i	-1.4347 + 0.0379i	0.1394 + 0.2472i	0.1348 + 0.0423i	0.1423 + 0.1903i	0.1108 - 0.1031i	
0.0563 + 0.0571i	-0.1331 + 0.1233i	-0.1967 + 0.2718i	-0.0588 + 0.0054i	0.0430 - 0.0477i	0.0183 + 0.0627i	
0.2068 - 0.1785i	-0.0585 + 0.0319i	0.0188 - 0.0468i	0.4032 - 0.0075i	-0.1677 + 0.0090i	-0.0300 + 0.0709i	
0.1929 + 0.0070i	0.1265 - 0.0791i	-0.1152 - 0.0958i	-0.3829 + 0.0562i	-1.3969 - 0.0157i	0.0882 + 0.2763i	
-0.0830 - 0.0800i	-0.0008 - 0.0584i	0.0367 - 0.0397i	0.0842 - 0.0421i	-0.0182 + 0.0987i	-0.2231 + 0.2215i	
SG.S12 =						
Columns 1 through 6						
0.0089 - 0.0005i	0.0153 - 0.0187i	-0.0219 + 0.0053i	0.0181 + 0.0155i	0.0491 - 0.0112i	-0.0073 - 0.0086i	
0.0190 + 0.0013i	0.6005 - 0.0511i	-0.6015 + 0.0094i	-0.0769 - 0.0439i	0.0975 + 0.0112i	0.0530 + 0.0313i	
-0.0000 - 0.0009i	-0.0561 - 0.0237i	-0.9472 + 0.0015i	-0.0024 + 0.0027i	0.0796 + 0.0328i	-0.0239 + 0.0890i	
0.0027 - 0.0021i	-0.0769 + 0.0949i	0.0345 - 0.0323i	0.1207 - 0.0007i	-0.3142 + 0.0655i	0.0246 + 0.0277i	
-0.0069 + 0.0075i	-0.6780 + 0.5588i	0.0077 - 0.1397i	0.0388 + 0.0035i	-2.0174 + 0.2128i	0.1530 + 0.0991i	
-0.0003 - 0.0106i	0.1462 - 0.3120i	0.0075 - 0.1101i	-0.0126 + 0.0076i	-0.2383 + 0.2489i	0.5562 + 0.5865i	
-0.0002 + 0.0009i	-0.0085 - 0.0331i	0.0063 + 0.0076i	0.0088 - 0.0051i	0.1185 - 0.0324i	-0.0195 - 0.0182i	
-0.0019 - 0.0045i	-0.2422 + 0.0910i	0.0918 - 0.0736i	0.0771 - 0.0260i	-0.4151 + 0.3874i	-0.0007 + 0.0004i	
0.0035 + 0.0026i	0.0666 + 0.0200i	0.0760 + 0.0184i	-0.0292 - 0.0118i	0.1710 - 0.0763i	0.0604 - 0.1533i	
-0.0055 + 0.0000i	-0.0887 + 0.0136i	0.0516 - 0.0035i	0.0079 + 0.0028i	0.0124 - 0.0213i	-0.0224 - 0.0118i	
-0.0039 - 0.0007i	-0.2746 + 0.0049i	0.3306 - 0.0143i	0.0069 + 0.0132i	-0.3459 - 0.2784i	-0.0260 + 0.0446i	
0.0054 - 0.0007i	0.2783 + 0.0325i	-0.2302 - 0.0240i	-0.0095 - 0.0040i	0.1073 + 0.1418i	0.0084 + 0.0209i	
-0.0025 + 0.0040i	0.2073 - 0.1360i	-0.1208 + 0.1441i	-0.1027 + 0.0051i	0.0117 - 0.0118i	0.0177 + 0.0139i	
0.0023 - 0.0074i	-0.0895 - 0.0625i	-0.0715 + 0.1113i	0.1033 + 0.0281i	-1.3799 + 0.0971i	0.0745 + 0.0549i	
0.0005 + 0.0040i	-0.0554 + 0.1865i	0.0412 - 0.1085i	-0.0051 - 0.0142i	-0.2242 + 0.2988i	-0.0047 - 0.0000i	
-0.0009 + 0.0028i	0.0065 - 0.0521i	0.0170 + 0.0421i	-0.0422 + 0.0388i	-0.0524 + 0.0059i	0.0136 + 0.0121i	
0.0010 + 0.0028i	0.1602 - 0.0042i	-0.1347 - 0.0502i	-0.0507 + 0.0029i	0.1506 - 0.0978i	0.0090 + 0.0344i	
-0.0010 - 0.0017i	-0.0593 - 0.0823i	0.0514 + 0.0448i	0.0259 + 0.0247i	0.0085 - 0.1346i	-0.0023 - 0.0023i	
Columns 7 through 12						
-0.0043 - 0.0034i	0.0093 - 0.0063i	-0.0002 + 0.0046i	-0.0051 + 0.0007i	-0.0024 + 0.0094i	-0.0081 - 0.0010i	
-0.0009 + 0.0156i	0.0136 + 0.0400i	0.0069 + 0.0049i	-0.0146 - 0.0006i	-0.2961 + 0.0283i	-0.1081 + 0.0051i	
0.0005 - 0.0045i	0.0094 + 0.0229i	0.0218 + 0.0461i	0.0003 + 0.0007i	0.0354 + 0.0130i	-0.0316 - 0.0025i	
0.0148 + 0.0082i	0.0478 + 0.0040i	-0.0113 - 0.0190i	0.0003 - 0.0018i	0.0125 - 0.0550i	0.0035 - 0.0585i	
0.0739 + 0.0373i	-0.3608 - 0.2713i	-0.0496 - 0.0113i	0.0132 - 0.0112i	0.3576 - 0.2873i	0.0297 + 0.0056i	
0.0047 + 0.0122i	0.0237 - 0.0253i	0.1059 + 0.0823i	-0.0006 + 0.0084i	-0.0754 + 0.1453i	0.0060 - 0.0339i	
0.0926 - 0.0032i	-0.1432 - 0.0072i	0.0174 + 0.0148i	0.0022 - 0.0029i	0.0086 + 0.0215i	0.0295 - 0.0024i	
-0.0514 - 0.0111i	-0.7860 + 0.0528i	0.0718 + 0.0276i	0.0016 + 0.0035i	0.1276 - 0.0516i	0.0039 - 0.0009i	
0.0184 - 0.0043i	-0.1453 + 0.1371i	0.3991 + 0.5981i	-0.0023 - 0.0017i	-0.0287 - 0.0067i	0.0062 + 0.0073i	
-0.0029 + 0.0016i	-0.0055 - 0.0037i	0.0010 + 0.0052i	0.0105 + 0.0002i	0.0550 - 0.0100i	-0.0100 - 0.0017i	
0.0056 + 0.0056i	0.0360 - 0.0027i	0.0108 - 0.0096i	0.0099 + 0.0028i	0.1565 - 0.0075i	-0.2747 + 0.0091i	
0.0070 + 0.0092i	0.0962 + 0.0632i	0.0055 + 0.0096i	-0.0089 + 0.0023i	-0.3765 - 0.0356i	-0.6314 - 0.0138i	
0.0458 + 0.0415i	0.0638 - 0.0002i	0.0078 - 0.0115i	0.0058 - 0.0074i	-0.1440 + 0.0723i	-0.0091 - 0.0434i	

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

```

0.0499 + 0.0158i -0.1262 - 0.1221i -0.0118 - 0.0140i 0.0002 + 0.0067i 0.0208 + 0.0629i -0.0055 + 0.0132i
0.0002 + 0.0075i -0.0764 + 0.0377i 0.0016 + 0.0046i -0.0008 - 0.0062i 0.0670 - 0.1181i 0.0633 + 0.0054i
0.0624 + 0.0009i 0.1267 - 0.1017i 0.0013 - 0.0250i 0.0016 - 0.0046i -0.0091 + 0.0281i 0.0010 - 0.0076i
-0.0953 + 0.0152i 1.0755 - 0.0165i -0.0061 - 0.0533i -0.0022 - 0.0044i -0.1072 - 0.0240i -0.0035 - 0.0358i
0.0130 - 0.0129i 0.0654 - 0.1996i 0.0118 + 0.0103i 0.0014 + 0.0021i 0.0421 + 0.0496i 0.0077 + 0.0090i

```

Columns 13 through 18

```

-0.0474 - 0.0373i 0.0433 - 0.0007i -0.0116 - 0.0198i -0.0232 - 0.0200i -0.0026 - 0.0086i 0.0091 + 0.0018i
0.1761 + 0.1140i 0.0214 - 0.0590i -0.0587 - 0.0228i 0.0146 + 0.0537i -0.0228 - 0.0392i 0.0163 + 0.0446i
0.0028 - 0.0111i 0.0623 + 0.0283i -0.0095 - 0.0002i -0.0000 - 0.0113i -0.0185 - 0.0185i 0.0061 + 0.0126i
-0.1333 + 0.0034i -0.2036 + 0.0412i 0.0289 + 0.0377i -0.0554 - 0.0600i 0.0029 + 0.0318i -0.0212 - 0.0238i
-0.1655 - 0.0190i -1.5451 + 0.1361i 0.2296 + 0.0457i 0.1734 + 0.0897i 0.2947 + 0.2455i -0.0386 - 0.1019i
0.0358 - 0.0099i -0.1490 + 0.1772i -0.0040 + 0.0075i 0.0270 + 0.0122i 0.0073 + 0.0597i 0.0408 + 0.0091i
0.0871 - 0.0822i 0.0411 - 0.0093i -0.0169 + 0.0290i 0.0909 - 0.0073i 0.1127 + 0.0129i 0.0120 + 0.0037i
-0.2199 + 0.0917i -0.2462 + 0.2643i 0.1006 + 0.0209i -0.1081 - 0.0389i 1.1552 - 0.0244i -0.1185 - 0.1190i
0.0670 + 0.0200i 0.1008 - 0.0491i -0.0278 + 0.0086i 0.0370 + 0.0061i 0.0797 - 0.1468i -0.0095 + 0.0314i
-0.0168 + 0.0027i 0.0049 - 0.0078i 0.0153 - 0.0112i -0.0137 + 0.0029i 0.0091 - 0.0060i 0.0022 - 0.0053i
-0.0994 - 0.0334i -0.1777 - 0.1193i 0.0843 - 0.0286i 0.0153 + 0.0089i 0.0700 + 0.0264i 0.0131 - 0.0516i
0.0154 + 0.1191i 0.1028 + 0.1114i 0.1242 - 0.0938i -0.0119 + 0.0226i 0.0050 - 0.0944i -0.0052 - 0.0365i
0.4474 - 0.0169i 0.0953 - 0.0197i 0.0021 - 0.0489i 0.1532 + 0.1312i -0.0807 - 0.0141i 0.0006 + 0.0660i
-0.3789 - 0.0917i -0.1497 + 0.0636i 0.2117 - 0.0333i 0.1496 + 0.0322i 0.0941 + 0.0598i -0.0932 - 0.0607i
0.0275 + 0.0476i -0.1517 + 0.1090i 0.6939 + 0.6162i 0.0057 + 0.0336i 0.0747 + 0.0435i 0.1525 + 0.0358i
0.1521 - 0.1346i -0.0544 + 0.0065i -0.0164 + 0.0257i 0.2646 - 0.0007i 0.0495 + 0.0285i 0.0431 - 0.0352i
0.1820 + 0.0087i 0.0691 - 0.0435i -0.0271 + 0.0797i -0.3006 + 0.0453i 0.0663 + 0.0167i 0.1987 - 0.0396i
-0.0999 - 0.0831i 0.0231 - 0.0753i -0.0182 - 0.1364i 0.0519 - 0.0424i -0.0960 + 0.0648i 0.6571 + 0.6644i

```

SG.S21 =

Columns 1 through 6

```

0.0089 - 0.0003i 0.0053 - 0.0032i -0.0002 + 0.0004i 0.0052 + 0.0056i 0.0175 + 0.0051i 0.0005 - 0.0012i
0.0817 + 0.0128i 0.5317 - 0.0385i -0.0233 - 0.0032i -0.0857 - 0.0225i 0.3421 + 0.1410i -0.0252 + 0.1045i
-0.0595 - 0.0056i -0.6885 - 0.0096i -0.9595 - 0.0021i 0.0367 + 0.0437i -0.0369 + 0.0111i -0.0604 + 0.0291i
0.0026 - 0.0065i -0.0164 - 0.0128i 0.0033 + 0.0030i 0.1082 - 0.0004i -0.0961 + 0.0090i -0.0049 - 0.0024i
-0.0361 + 0.0123i -0.2714 + 0.1165i -0.1937 + 0.0319i -0.0222 + 0.0203i -1.9274 + 0.1816i 0.1907 + 0.1282i
0.0036 + 0.0010i -0.1248 - 0.0311i 0.0176 - 0.2112i -0.0232 + 0.0253i -0.1890 + 0.2475i 0.5548 + 0.5878i
-0.0020 + 0.0070i 0.0118 - 0.0262i -0.0052 - 0.0013i 0.0013 - 0.0030i -0.0119 - 0.0088i 0.0016 + 0.0124i
-0.0174 + 0.0018i -0.0849 + 0.0823i -0.0265 + 0.0422i 0.0536 - 0.0000i -0.2992 + 0.3368i -0.0033 - 0.0572i
-0.0083 - 0.0128i 0.0145 - 0.0851i 0.0458 - 0.0304i 0.0161 - 0.0066i 0.0708 - 0.0655i 0.0711 - 0.1522i
-0.0056 - 0.0003i -0.0170 + 0.0023i -0.0008 + 0.0004i 0.0030 + 0.0022i 0.0092 + 0.0037i 0.0038 - 0.0058i
-0.0381 - 0.0025i -0.3653 + 0.0178i 0.0432 + 0.0104i -0.0077 + 0.0155i -0.2261 - 0.1879i 0.0135 - 0.0872i
-0.0258 + 0.0002i -0.3417 - 0.0148i 0.0395 + 0.0058i 0.0009 + 0.0830i 0.0254 - 0.0405i -0.0143 - 0.0349i
-0.0096 + 0.0183i 0.1860 - 0.1239i 0.0002 + 0.0024i -0.0963 - 0.0007i 0.2579 - 0.0521i 0.0074 + 0.0070i
-0.0007 + 0.0119i -0.2747 + 0.2508i -0.0470 + 0.0074i -0.0840 - 0.0046i -1.4758 + 0.1312i 0.0472 + 0.0660i
0.0018 - 0.0079i 0.0928 - 0.0253i -0.0074 + 0.0086i 0.0006 + 0.0114i -0.0259 + 0.3152i 0.0028 - 0.0071i
-0.0012 + 0.0097i -0.0110 - 0.0308i -0.0040 + 0.0120i -0.0419 + 0.0378i -0.1223 + 0.0446i 0.0145 - 0.0205i
0.0081 - 0.0035i 0.0402 - 0.0227i 0.0005 - 0.0209i -0.0180 + 0.0046i 0.1906 - 0.2073i 0.0114 + 0.0434i
0.0035 + 0.0053i -0.0070 + 0.0397i -0.0003 - 0.0072i -0.0020 - 0.0099i -0.0519 - 0.0494i -0.0020 + 0.0040i

```

Columns 7 through 12

```

-0.0001 - 0.0018i 0.0031 - 0.0016i -0.0007 - 0.0000i -0.0052 + 0.0000i 0.0033 - 0.0005i -0.0037 - 0.0020i
0.0163 + 0.0124i 0.2181 + 0.0018i 0.0379 + 0.0425i -0.0734 - 0.0174i -0.2892 + 0.0175i -0.2261 + 0.0110i
0.0021 - 0.0170i -0.1281 - 0.0037i 0.0164 + 0.0365i 0.0621 + 0.0071i 0.3882 + 0.0073i 0.0615 + 0.0002i
-0.0000 + 0.0024i -0.0309 - 0.0001i 0.0110 + 0.0031i -0.0003 + 0.0030i -0.0258 + 0.0084i -0.0047 - 0.0417i
0.0622 + 0.0051i -0.3549 - 0.2099i -0.0302 - 0.0482i 0.0636 - 0.0153i 0.0605 + 0.0449i 0.0666 - 0.0669i
0.0294 - 0.0048i -0.0515 - 0.0482i 0.1042 + 0.0734i 0.0049 - 0.0047i 0.0664 + 0.0490i 0.0026 + 0.0013i
0.0890 - 0.0005i -0.0515 - 0.0199i 0.0051 - 0.0031i 0.0079 - 0.0120i -0.0103 + 0.0165i 0.0121 + 0.0009i
-0.0070 + 0.0045i -0.8269 + 0.0951i 0.0693 + 0.0693i 0.0182 - 0.0057i 0.0134 - 0.0472i 0.0077 - 0.0575i
-0.0307 + 0.0018i -0.0820 + 0.1134i 0.3965 + 0.5993i 0.0027 + 0.0139i -0.0117 + 0.0400i -0.0013 + 0.0127i
0.0000 + 0.0001i -0.0011 + 0.0024i -0.0028 - 0.0018i 0.0105 + 0.0003i 0.0155 - 0.0030i -0.0003 - 0.0010i
0.0044 - 0.0099i -0.0683 - 0.0419i -0.0377 - 0.0389i 0.0428 + 0.0060i 0.2227 - 0.0109i -0.1424 - 0.0003i
0.0137 - 0.0116i -0.0039 - 0.0552i -0.0163 - 0.0056i 0.0176 + 0.0006i -0.0960 - 0.0117i -0.6160 - 0.0067i
0.0555 + 0.0465i 0.1842 + 0.0365i 0.0228 + 0.0092i 0.0252 - 0.0302i -0.1109 + 0.0754i -0.0026 + 0.0227i
0.0217 + 0.0001i -0.2075 - 0.0887i -0.0097 - 0.0316i 0.0057 - 0.0097i 0.0894 - 0.0773i -0.0099 - 0.0281i
0.0208 + 0.0082i -0.0375 + 0.0675i 0.0050 + 0.0078i 0.0061 + 0.0060i -0.0388 - 0.0065i 0.0435 - 0.0624i
0.0615 - 0.0060i -0.0853 - 0.0390i 0.0028 + 0.0133i 0.0061 - 0.0136i 0.0009 + 0.0251i -0.0048 + 0.0062i
0.1321 - 0.0001i 1.0519 - 0.0472i 0.0017 - 0.0712i -0.0120 - 0.0008i 0.0037 + 0.0239i -0.0106 - 0.0018i
-0.0304 - 0.0096i -0.0055 - 0.1757i 0.0086 + 0.0165i -0.0081 - 0.0025i -0.0100 - 0.0247i -0.0020 + 0.0154i

```

Columns 13 through 18

```

-0.0081 - 0.0076i 0.0114 + 0.0061i 0.0051 - 0.0032i -0.0041 - 0.0090i 0.0005 - 0.0012i -0.0016 + 0.0001i
0.2500 + 0.1426i 0.3038 + 0.2508i 0.0637 - 0.1112i 0.0300 + 0.0538i -0.1124 - 0.0384i -0.0623 - 0.0247i
-0.1393 - 0.1608i -0.0457 - 0.0805i -0.0410 + 0.0512i 0.0071 - 0.0467i 0.0296 + 0.0342i 0.0397 + 0.0481i
-0.0988 - 0.0008i -0.0296 + 0.0022i -0.0135 - 0.0015i -0.0983 - 0.0778i -0.0037 + 0.0113i 0.0212 - 0.0070i
-0.2982 - 0.0809i -1.5623 + 0.0663i 0.1786 + 0.2083i 0.0724 + 0.0252i 0.3000 + 0.2971i 0.0781 - 0.0766i
0.0228 - 0.0287i -0.0893 + 0.1554i 0.0132 - 0.0080i 0.0451 + 0.0123i 0.0593 + 0.0654i 0.0217 + 0.0048i
0.1014 - 0.0824i 0.0100 + 0.0018i 0.0010 - 0.0211i 0.0811 - 0.0013i 0.0018 + 0.0098i -0.0173 + 0.0201i
-0.1389 + 0.0272i -0.2458 + 0.2322i 0.0862 + 0.0528i 0.1650 - 0.0395i 1.1405 - 0.0333i -0.0744 - 0.1468i
-0.0026 - 0.0164i 0.0419 - 0.0486i -0.0294 + 0.0080i -0.0356 - 0.0196i 0.0128 - 0.1314i -0.0110 + 0.0236i
-0.0010 + 0.0012i 0.0040 - 0.0016i 0.0002 + 0.0015i -0.0019 - 0.0019i 0.0025 - 0.0033i 0.0003 + 0.0009i
-0.0732 - 0.0781i -0.1673 - 0.1679i 0.0455 + 0.0457i 0.0107 - 0.0348i 0.0835 + 0.0137i 0.0009 + 0.0024i
-0.0068 - 0.0931i 0.0318 - 0.0213i 0.0913 + 0.0645i -0.0254 - 0.0442i 0.0151 + 0.0006i -0.0054 + 0.0083i
0.4578 + 0.0011i 0.0430 - 0.0015i 0.0164 + 0.0111i 0.1638 + 0.1408i -0.1117 - 0.0416i -0.0411 - 0.0009i
0.0707 + 0.0118i -0.2485 + 0.0635i 0.2466 + 0.0833i -0.0467 - 0.0258i 0.1685 + 0.0935i -0.0471 - 0.0379i
-0.0373 - 0.0214i -0.0562 + 0.1451i 0.6965 + 0.6112i 0.0731 + 0.0027i 0.0371 + 0.0158i 0.1617 + 0.0248i
0.1238 - 0.1187i -0.0595 + 0.0367i 0.0292 - 0.0468i 0.2694 - 0.0119i -0.0818 + 0.0074i -0.0153 + 0.0394i
-0.0186 + 0.0093i 0.1280 - 0.1057i -0.0451 + 0.1555i 0.2308 + 0.0064i 0.1067 + 0.0395i 0.1869 + 0.0008i
0.0350 + 0.0428i 0.0117 - 0.0344i -0.0089 - 0.1469i -0.1014 - 0.0224i -0.0652 + 0.0413i 0.6442 + 0.6765i

```

SG.S22 =

Columns 1 through 6

```

-0.3477 - 0.0000i 0.0031 - 0.0021i -0.0016 + 0.0020i -0.0001 - 0.0003i 0.0174 + 0.0116i 0.0010 - 0.0017i
0.0226 + 0.0014i 1.3168 - 0.0544i -0.6356 + 0.0243i -0.0724 - 0.0443i 0.3636 + 0.2251i 0.0683 + 0.0227i
-0.0182 - 0.0009i -0.8190 - 0.0158i 0.2335 - 0.0171i 0.0458 + 0.0564i -0.0746 - 0.0582i 0.0158 + 0.0017i
-0.0007 + 0.0010i 0.0069 - 0.0108i 0.0076 + 0.0163i -0.8477 - 0.0007i -0.0147 - 0.0122i 0.0043 + 0.0024i
-0.0005 - 0.0030i -0.4485 + 0.2394i 0.0314 - 0.0512i 0.0876 + 0.0271i -2.7973 + 0.1732i 0.1746 + 0.1810i
-0.0665 - 0.0043i -0.1003 - 0.1255i -0.1016 + 0.0450i -0.0056 + 0.0047i -0.2518 + 0.2529i -0.4271 + 0.3566i
-0.0023 + 0.0020i 0.0139 - 0.0295i -0.0182 + 0.0224i -0.0500 + 0.0432i -0.0295 - 0.0059i 0.0089 + 0.0047i
0.0005 - 0.0003i -0.1516 + 0.1656i 0.0839 - 0.0028i 0.0386 - 0.0186i -0.3783 + 0.4132i -0.0256 - 0.0738i
0.0021 - 0.0021i 0.0126 - 0.1101i -0.0005 - 0.0293i -0.0084 + 0.0030i 0.1276 - 0.0899i 0.1034 - 0.0693i

```

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)



-0.5346 + 0.0000i -0.0322 + 0.0039i 0.0191 + 0.0006i -0.0024 - 0.0038i 0.0089 + 0.0069i 0.0000 - 0.0037i
 -0.0184 - 0.0004i -1.3063 + 0.0278i 0.4750 - 0.0021i 0.0554 + 0.0266i -0.1314 - 0.0744i -0.0444 - 0.0431i
 -0.0017 + 0.0004i -0.0661 - 0.0040i 0.0807 + 0.0107i 0.0075 - 0.0207i 0.1054 + 0.0254i -0.0059 - 0.0423i
 -0.0054 + 0.0078i 0.2390 - 0.1515i -0.1252 + 0.1374i -0.6094 + 0.0026i 0.1894 - 0.0361i 0.0080 + 0.0004i
 -0.0050 + 0.0040i -0.2596 + 0.2333i 0.0084 - 0.0802i 0.0400 - 0.0020i -1.0019 + 0.1473i 0.0586 + 0.0294i
 0.0042 + 0.0002i 0.0759 + 0.0584i -0.0649 - 0.0000i 0.0067 + 0.0046i -0.1643 + 0.3097i 0.0045 + 0.0078i
 -0.0005 + 0.0021i -0.0104 - 0.0369i 0.0232 + 0.0382i -0.0173 + 0.0227i -0.0651 + 0.0366i 0.0101 - 0.0050i
 -0.0004 + 0.0010i 0.0751 - 0.0561i -0.0166 + 0.0560i -0.0190 + 0.0112i 0.0693 - 0.0873i -0.0013 - 0.0087i
 -0.0005 + 0.0010i -0.0023 + 0.0315i -0.0099 - 0.0437i 0.0018 - 0.0049i 0.0274 - 0.0775i -0.0062 + 0.0059i

Columns 7 through 12

-0.0030 - 0.0029i 0.0013 + 0.0000i -0.0008 + 0.0004i -0.5343 + 0.0000i -0.0097 + 0.0034i 0.0043 + 0.0019i
 -0.0000 + 0.0094i 0.1274 + 0.0469i 0.0030 + 0.0180i -0.0265 - 0.0030i -1.2390 + 0.0314i 0.1419 - 0.0095i
 0.0112 - 0.0115i -0.0415 - 0.0236i 0.0086 - 0.0130i 0.0166 + 0.0013i 0.3948 + 0.0054i 0.0092 - 0.0003i
 -0.0474 - 0.0414i -0.0351 - 0.0058i 0.0022 - 0.0045i -0.0047 + 0.0048i 0.0366 + 0.0010i 0.0021 + 0.0495i
 0.0488 + 0.0240i -0.3294 - 0.3170i -0.0171 - 0.0536i 0.0051 - 0.0016i 0.2512 - 0.1457i 0.0321 - 0.0100i
 0.0227 + 0.0109i -0.0227 - 0.0367i 0.0415 + 0.1214i 0.0054 + 0.0026i 0.0536 + 0.0529i 0.0027 - 0.0235i
 -0.7858 + 0.0010i 0.0363 + 0.0038i -0.0024 - 0.0029i 0.0011 - 0.0017i -0.0087 + 0.0175i -0.0150 + 0.0018i
 0.0472 - 0.0192i -1.7809 + 0.0575i 0.0642 + 0.1377i 0.0014 + 0.0005i 0.1083 - 0.0630i 0.0097 + 0.0353i
 -0.0082 - 0.0066i -0.1042 + 0.1276i -0.5674 + 0.3490i -0.0015 + 0.0025i -0.0044 + 0.0550i 0.0039 - 0.0024i
 -0.0021 - 0.0012i 0.0002 + 0.0007i -0.0011 - 0.0003i -0.2142 - 0.0000i 0.0103 - 0.0007i 0.0031 + 0.0013i
 0.0070 - 0.0070i -0.0262 - 0.0631i -0.0096 - 0.0107i 0.0098 - 0.0012i -0.2738 - 0.0110i 0.2360 - 0.0013i
 -0.0140 - 0.0149i -0.0010 - 0.0527i -0.0081 - 0.0029i 0.0063 - 0.0021i 0.2944 + 0.0203i -0.3656 + 0.0122i
 0.0264 + 0.0302i 0.0992 + 0.0327i 0.0165 - 0.0078i 0.0072 - 0.0092i -0.1387 - 0.0832i -0.0044 + 0.0039i
 0.0240 + 0.0119i -0.0952 + 0.0094i -0.0166 - 0.0037i 0.0095 - 0.0079i 0.1676 - 0.1449i 0.0674 - 0.0078i
 0.0271 + 0.0032i -0.0717 - 0.0013i -0.0049 + 0.0064i -0.0059 + 0.0006i -0.0647 + 0.0001i -0.0158 + 0.0754i
 0.5975 - 0.0016i -0.0252 - 0.0149i 0.0082 - 0.0109i 0.0028 - 0.0041i 0.0022 + 0.0207i 0.0106 - 0.0087i
 -0.0017 + 0.0028i 0.3641 - 0.0589i -0.0191 + 0.0100i 0.0009 - 0.0009i -0.0488 + 0.0270i -0.0071 - 0.0056i
 -0.0153 - 0.0082i 0.1544 - 0.1442i 0.0272 - 0.0136i 0.0012 - 0.0011i 0.0101 - 0.0246i 0.0063 - 0.0064i

Columns 13 through 18

-0.0126 - 0.0126i 0.0078 + 0.0044i -0.0025 - 0.0022i -0.0054 - 0.0071i -0.0033 - 0.0000i -0.0006 + 0.0010i
 0.2626 + 0.1248i 0.1992 + 0.0905i -0.1353 - 0.0151i 0.0139 + 0.0389i -0.1139 - 0.0521i -0.0032 + 0.0765i
 -0.1368 - 0.1357i -0.0501 - 0.0134i 0.0634 + 0.0146i 0.0106 - 0.0458i 0.0597 - 0.0009i 0.0079 - 0.0545i
 -0.6058 + 0.0028i -0.0077 - 0.0050i -0.0058 + 0.0104i -0.0619 - 0.0562i 0.0363 - 0.0008i 0.0128 - 0.0188i
 -0.2546 - 0.0696i -1.0470 + 0.1200i 0.2183 + 0.0283i 0.1548 + 0.0510i 0.3118 + 0.3086i -0.0561 - 0.0827i
 0.0126 - 0.0210i -0.2091 + 0.1788i 0.0101 + 0.0121i 0.0554 + 0.0181i -0.0146 + 0.0111i 0.0129 + 0.0032i
 0.0807 - 0.0720i -0.0224 - 0.0055i -0.0043 - 0.0143i 0.6166 + 0.0012i -0.0171 + 0.0013i 0.0155 - 0.0159i
 -0.1655 + 0.0501i -0.2412 + 0.2791i 0.0448 - 0.0562i 0.0895 - 0.0413i 0.4782 - 0.0484i -0.1433 - 0.0314i
 0.0159 + 0.0014i 0.1165 - 0.0695i -0.0219 + 0.0215i -0.0185 - 0.0170i 0.1799 - 0.1133i 0.0191 - 0.0122i
 -0.0020 + 0.0013i 0.0062 + 0.0052i -0.0003 + 0.0003i -0.0022 - 0.0010i -0.0015 + 0.0001i -0.0009 - 0.0003i
 -0.0678 - 0.0624i -0.0868 - 0.0461i -0.0136 + 0.0791i 0.0126 - 0.0204i 0.0041 + 0.0760i -0.0142 - 0.0073i
 -0.0171 - 0.0647i 0.0271 - 0.0026i -0.0942 + 0.1458i -0.0034 - 0.0305i -0.0110 + 0.0549i 0.0044 + 0.0431i
 1.1734 - 0.0080i 0.1232 - 0.0365i -0.0099 - 0.0365i 0.1419 + 0.1391i -0.0826 - 0.0305i -0.0079 + 0.0737i
 -0.1163 + 0.0134i -1.5963 + 0.0730i 0.1952 + 0.1859i 0.0743 + 0.0288i 0.1564 + 0.1302i 0.0124 - 0.1034i
 -0.0154 - 0.0191i 0.0000 + 0.1356i -0.2530 + 0.2227i 0.0745 + 0.0248i 0.0117 - 0.0385i 0.0228 + 0.0663i
 0.1236 - 0.1327i -0.0445 + 0.0185i -0.0014 - 0.0033i 0.8510 - 0.0076i 0.0490 + 0.0268i 0.0301 - 0.0113i
 0.0655 - 0.0402i 0.1070 - 0.1331i -0.1034 - 0.0783i 0.0264 + 0.0027i -1.4274 + 0.0107i 0.1371 + 0.2267i
 -0.0252 + 0.0154i -0.0373 - 0.0072i 0.0434 - 0.0250i -0.0596 - 0.0187i 0.0094 + 0.0755i -0.2341 + 0.2101i

===== STEP 8: REFLECTION SIDE

Q =

Columns 1 through 13

4.2874	0	0	0	0	0	0	0	0	0	-2.8555	0	0	0
0	2.0637	0	0	0	0	0	0	0	0	0	0.8750	0	0
0	0	-0.1599	0	0	0	0	0	0	0	0	0	1.9932	0
0	0	0	1.3494	0	0	0	0	0	0	0	0	0	-2.8555
0	0	0	0	0.6495	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	-0.0503	0	0	0	0	0	0	0
0	0	0	0	0	0	0	-1.5886	0	0	0	0	0	0
0	0	0	0	0	0	0	0	-0.7647	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0.0593	0	0	0	0
1.7858	0	0	0	0	0	0	0	0	0	-4.2874	0	0	0
0	1.7858	0	0	0	0	0	0	0	0	0	-2.0637	0	0
0	0	1.7858	0	0	0	0	0	0	0	0	0	0.1599	0
0	0	0	-1.6250	0	0	0	0	0	0	0	0	0	-1.3494
0	0	0	0	-1.6250	0	0	0	0	0	0	0	0	0
0	0	0	0	0	-1.6250	0	0	0	0	0	0	0	0
0	0	0	0	0	0	-1.4802	0	0	0	0	0	0	0
0	0	0	0	0	0	0	-1.4802	0	0	0	0	0	0
0	0	0	0	0	0	0	0	-1.4802	0	0	0	0	0

Columns 14 through 18

0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0.8750	0	0	0	0	0
0	1.9932	0	0	0	0
0	0	-2.8555	0	0	0
0	0	0	0.8750	0	0
0	0	0	0	1.9932	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
-0.6495	0	0	0	0	0
0	0.0503	0	0	0	0
0	0	1.5886	0	0	0
0	0	0	0.7647	0	0
0	0	0	0	-0.0593	0

LAM =

Columns 1 through 6

2.5771 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
 0.0000 + 0.0000i 1.7061 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0289 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.9834 - 0.9119i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.1719 - 0.1815i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.5835 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.9900 - 0.8800i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.1883 - 0.1645i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.6362 + 0.0000i

ST.S22 =
Columns 1 through 6

0.1624 + 0.1543i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.2404 + 0.7193i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.3030 + 0.9511i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.9040 - 0.1210i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.7344 - 0.4236i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.5746 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.9472 - 0.2292i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.4002 - 0.5144i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i -0.0275 + 0.0527i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.2672 - 0.3111i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -0.0812 - 0.5241i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0216 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i

Columns 7 through 12

0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.9472 - 0.2292i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.4002 - 0.5144i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -0.0275 + 0.0527i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.8759 - 0.0846i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.7802 - 0.2779i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.6143 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -0.0739 + 0.2115i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.7564 + 0.0561i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.9538 - 0.2944i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
-0.3173 + 0.3534i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0398 + 0.5590i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i -0.0289 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i

Columns 13 through 18

0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.2672 - 0.3111i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i -0.0812 - 0.5241i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0216 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -0.3173 + 0.3534i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0398 + 0.5590i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -0.0289 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0166 + 0.9119i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.8281 + 0.1815i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.4165 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0100 + 0.8800i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.8117 + 0.1645i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.3638 + 0.0000i

===== STEP 10: CONNECT

SG.S11 =
Columns 1 through 6

-0.2319 - 0.0012i -0.0407 - 0.0090i 0.0037 - 0.0160i -0.0432 - 0.0402i 0.0300 - 0.0281i -0.0060 + 0.0040i
0.0498 - 0.0122i 0.1767 - 0.2178i -0.1356 - 0.2602i 0.0010 - 0.0092i 0.1122 - 0.0084i -0.0770 + 0.0394i
-0.0333 - 0.0258i -0.1427 - 0.3867i -0.0617 - 0.8331i -0.0144 + 0.0121i -0.0254 + 0.0421i -0.0116 - 0.0615i
-0.0316 + 0.0339i 0.0521 - 0.0216i -0.0077 + 0.0037i -0.6782 + 0.0846i 0.0268 + 0.0638i 0.0047 - 0.0065i
0.0192 + 0.0182i -0.1056 + 0.0621i 0.0388 - 0.0382i -0.0551 - 0.0005i -0.0491 - 0.0533i -0.0454 - 0.0111i
0.0132 - 0.0329i 0.1454 - 0.0494i 0.0188 + 0.0417i 0.0062 + 0.0105i -0.0593 - 0.0053i -0.3012 - 0.0803i
-0.0202 - 0.0009i -0.0038 - 0.0018i 0.0062 - 0.0103i -0.1114 + 0.1593i -0.0549 - 0.0290i -0.0161 + 0.0061i
-0.0023 + 0.0011i 0.0021 - 0.0257i 0.0220 + 0.0143i 0.0261 - 0.0258i -0.0369 + 0.0309i 0.0207 - 0.0206i
0.0066 + 0.0173i -0.0019 + 0.0458i -0.0195 + 0.0057i -0.0187 - 0.0203i 0.0289 - 0.0285i -0.0173 + 0.0491i
-0.3530 + 0.0049i -0.1209 + 0.0294i 0.0266 + 0.0101i -0.0517 - 0.0609i 0.0323 - 0.0172i 0.0070 + 0.0062i
-0.0958 + 0.0153i -0.4775 + 0.2485i 0.0310 + 0.1829i 0.1283 + 0.0218i -0.0697 + 0.0924i 0.0623 - 0.0131i
0.0242 - 0.0003i 0.0346 + 0.0677i 0.0113 - 0.1074i -0.0101 - 0.0014i -0.0013 - 0.0396i -0.0123 + 0.0062i
-0.0347 + 0.0445i 0.0406 - 0.0843i -0.0936 + 0.0108i -0.3375 + 0.0666i 0.0009 + 0.0151i 0.0141 + 0.0022i
-0.0023 - 0.0286i 0.0515 - 0.0447i -0.0431 - 0.0024i 0.0374 + 0.0497i 0.2046 - 0.0152i 0.0168 + 0.0152i
-0.0109 + 0.0135i -0.0092 + 0.0244i 0.0257 + 0.0125i -0.0049 - 0.0171i -0.0172 + 0.0167i -0.0043 - 0.0070i
0.0076 + 0.0130i -0.0117 - 0.0110i -0.0054 + 0.0477i 0.0271 - 0.0127i 0.0180 + 0.0670i 0.0196 - 0.0193i
-0.0034 + 0.0007i 0.0268 - 0.0184i 0.0087 - 0.0140i -0.0154 + 0.0116i -0.0298 + 0.0147i 0.0068 - 0.0082i
-0.0009 - 0.0030i -0.0221 - 0.0005i -0.0008 + 0.0170i 0.0202 - 0.0018i 0.0001 - 0.0018i 0.0037 + 0.0012i

Columns 7 through 12

-0.0383 + 0.0069i -0.0119 - 0.0085i 0.0016 - 0.0014i -0.3519 + 0.0062i -0.0952 + 0.0167i 0.0351 - 0.0050i



RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

Table with 18 columns of numerical values, representing the first set of benchmark data.

Columns 13 through 18

Table with 18 columns of numerical values, representing the second set of benchmark data.

SG.S12 =

Columns 1 through 6

Table with 18 columns of numerical values, representing the third set of benchmark data.

Columns 7 through 12

Table with 18 columns of numerical values, representing the fourth set of benchmark data.

Columns 13 through 18

Table with 18 columns of numerical values, representing the fifth set of benchmark data.

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)



SG.S21 =

Columns 1 through 6

0.0131 - 0.0051i 0.0062 - 0.0151i -0.0082 - 0.0032i 0.0036 + 0.0048i 0.0040 - 0.0025i -0.0022 + 0.0045i
 -0.0085 - 0.0430i -0.2164 - 0.1858i -0.2317 + 0.2468i -0.0406 + 0.0511i -0.1379 - 0.0768i 0.0530 + 0.0549i
 -0.0075 + 0.0379i -0.1992 + 0.4320i -0.5125 + 0.7176i 0.0308 + 0.0130i 0.0391 - 0.0676i -0.0397 + 0.1562i
 -0.0026 - 0.0059i 0.0232 + 0.0150i -0.0463 + 0.0023i 0.1502 - 0.0641i -0.0402 + 0.0574i 0.0009 + 0.0068i
 -0.0065 + 0.0035i 0.0892 + 0.0394i -0.0873 + 0.0500i -0.0181 + 0.0361i 0.2295 + 0.7059i 0.0965 - 0.0265i
 -0.0012 + 0.0053i -0.1049 - 0.0331i -0.0213 - 0.1528i 0.0002 + 0.0055i 0.1196 - 0.0742i 0.4717 + 0.3275i
 0.0019 + 0.0007i -0.0074 - 0.0058i 0.0181 - 0.0072i 0.0428 - 0.0606i 0.0526 - 0.0312i -0.0169 + 0.0030i
 -0.0043 + 0.0038i -0.0084 + 0.0156i 0.0073 - 0.0234i -0.0006 - 0.0354i 0.1174 - 0.1292i -0.0720 + 0.0461i
 -0.0065 - 0.0067i 0.0226 - 0.0307i 0.0373 - 0.0196i -0.0001 + 0.0060i -0.0737 + 0.0855i 0.0009 - 0.1212i
 -0.0139 + 0.0082i -0.0061 + 0.0168i 0.0093 + 0.0047i -0.0046 - 0.0005i -0.0026 + 0.0013i 0.0034 - 0.0046i
 0.0276 + 0.0200i 0.2054 + 0.0473i 0.1683 + 0.0684i -0.0703 - 0.0126i -0.0241 + 0.0195i -0.0254 - 0.0343i
 -0.0139 - 0.0010i -0.1122 - 0.1074i -0.0178 + 0.0466i -0.0080 + 0.0130i 0.0427 - 0.0439i -0.0062 - 0.0044i
 0.0177 + 0.0121i -0.0608 - 0.0066i 0.0036 + 0.0850i 0.0705 + 0.0805i -0.0130 + 0.0181i 0.0015 - 0.0056i
 -0.0033 - 0.0043i -0.0285 + 0.0585i -0.0006 + 0.0220i -0.0399 + 0.0020i 0.0389 + 0.1790i -0.0078 + 0.0128i
 -0.0001 - 0.0080i 0.0395 - 0.0470i -0.0097 - 0.0256i 0.0122 + 0.0023i 0.0584 - 0.0299i -0.0105 - 0.0076i
 0.0089 - 0.0013i -0.0043 + 0.0126i 0.0378 + 0.0058i 0.0195 + 0.0243i 0.0283 - 0.0098i -0.0151 - 0.0076i
 -0.0002 - 0.0024i -0.0026 - 0.0091i -0.0197 + 0.0104i 0.0123 + 0.0278i -0.0037 - 0.0228i 0.0032 + 0.0194i
 0.0011 + 0.0034i 0.0018 + 0.0137i 0.0135 - 0.0088i 0.0028 - 0.0244i -0.0069 - 0.0001i -0.0030 - 0.0060i

Columns 7 through 12

-0.0007 + 0.0011i -0.0031 - 0.0001i 0.0024 + 0.0005i -0.0141 + 0.0080i -0.0025 + 0.0095i -0.0010 - 0.0004i
 0.0016 + 0.0052i -0.1000 + 0.0906i 0.0449 - 0.0286i 0.0194 + 0.0295i 0.1811 + 0.0577i -0.0267 - 0.0272i
 -0.0018 - 0.0087i 0.0039 - 0.0216i 0.0735 + 0.0471i 0.0146 - 0.0372i 0.0645 - 0.2250i -0.0020 + 0.0013i
 0.0661 + 0.0231i 0.0489 - 0.0150i 0.0071 + 0.0032i 0.0206 - 0.0048i -0.0360 + 0.0407i 0.0440 - 0.0246i
 0.0195 - 0.0329i 0.1428 + 0.1090i -0.0560 - 0.0185i -0.0042 - 0.0133i -0.0372 + 0.0363i -0.0346 - 0.0401i
 0.0027 + 0.0023i -0.0848 - 0.0054i 0.1136 - 0.0037i 0.0059 - 0.0007i 0.0574 + 0.0079i -0.0022 - 0.0033i
 0.1155 - 0.0337i -0.0887 + 0.0421i 0.0117 - 0.0015i -0.0001 - 0.0082i 0.0092 + 0.0145i -0.0044 + 0.0141i
 -0.0044 + 0.0572i 0.1281 + 0.7422i 0.1198 - 0.0336i 0.0051 - 0.0024i -0.0134 - 0.0062i 0.0217 - 0.0047i
 -0.0054 - 0.0113i 0.1387 - 0.0871i 0.4317 + 0.3776i -0.0004 + 0.0041i -0.0066 + 0.0191i -0.0024 - 0.0037i
 0.0007 + 0.0006i 0.0019 + 0.0002i -0.0025 - 0.0010i 0.0168 - 0.0068i 0.0079 - 0.0074i 0.0019 - 0.0005i
 -0.0094 + 0.0219i 0.0095 + 0.0010i -0.0206 + 0.0070i -0.0047 - 0.0185i 0.0378 - 0.1727i -0.0895 - 0.2121i
 0.0077 + 0.0151i -0.0188 - 0.0144i 0.0004 + 0.0052i 0.0013 + 0.0041i -0.1248 - 0.1260i -0.2386 - 0.5071i
 0.0241 - 0.0356i -0.0498 - 0.0183i 0.0158 - 0.0070i -0.0332 - 0.0353i 0.0402 + 0.0469i 0.0558 - 0.0348i
 0.0125 - 0.0265i -0.0198 - 0.0152i 0.0093 - 0.0093i -0.0120 + 0.0050i 0.0302 - 0.0150i -0.0322 - 0.0536i
 0.0014 + 0.0121i 0.0018 + 0.0045i 0.0015 + 0.0075i 0.0068 + 0.0106i -0.0121 - 0.0000i 0.0996 + 0.0220i
 -0.0493 - 0.0795i 0.0120 - 0.0037i 0.0125 - 0.0008i -0.0178 - 0.0032i 0.0062 + 0.0007i -0.0031 + 0.0044i
 0.0554 - 0.0126i -0.0296 - 0.2440i 0.0188 - 0.0210i -0.0041 + 0.0036i 0.0188 + 0.0125i -0.0063 + 0.0013i
 -0.0193 + 0.0037i -0.0726 + 0.0464i 0.0027 + 0.0127i -0.0053 - 0.0009i -0.0129 - 0.0068i 0.0041 + 0.0024i

Columns 13 through 18

-0.0141 - 0.0037i -0.0015 - 0.0004i 0.0018 - 0.0025i -0.0054 - 0.0049i 0.0017 - 0.0000i -0.0012 + 0.0003i
 -0.0272 - 0.0741i -0.0256 - 0.0098i -0.0135 - 0.0061i 0.0262 - 0.0364i 0.0565 - 0.0504i -0.0123 + 0.0278i
 -0.0718 + 0.0365i 0.0152 - 0.0470i 0.0053 + 0.0318i -0.0250 - 0.0051i -0.0279 - 0.0049i 0.0342 + 0.0047i
 0.0662 + 0.0841i 0.0010 + 0.0186i -0.0127 + 0.0032i -0.0767 + 0.0205i -0.0365 + 0.0037i 0.0063 - 0.0154i
 -0.0355 + 0.0085i 0.0390 + 0.1731i 0.0123 + 0.0057i 0.0112 - 0.0294i -0.0702 - 0.0447i 0.0228 + 0.0013i
 0.0058 - 0.0098i 0.0378 - 0.0103i -0.0129 - 0.0077i 0.0052 + 0.0010i 0.0258 - 0.0021i 0.0060 + 0.0042i
 -0.0069 - 0.0703i 0.0318 - 0.0106i -0.0239 - 0.0092i -0.0482 - 0.0854i 0.0377 - 0.0204i -0.0076 + 0.0089i
 0.0316 + 0.0318i 0.0393 - 0.0573i -0.0091 + 0.0262i 0.0462 + 0.0106i -0.0311 - 0.2479i -0.0078 - 0.0110i
 -0.0119 - 0.0148i -0.0221 + 0.0182i 0.0012 + 0.0027i -0.0117 - 0.0143i -0.0390 + 0.0246i 0.0010 + 0.0133i
 0.0165 + 0.0025i 0.0029 - 0.0006i -0.0019 + 0.0040i 0.0066 + 0.0021i -0.0012 - 0.0000i 0.0009 - 0.0004i
 0.0390 + 0.0523i -0.0635 - 0.0044i 0.0493 + 0.0014i 0.0223 + 0.0025i -0.0005 + 0.0144i -0.0055 - 0.0175i
 -0.0029 - 0.0081i 0.0278 - 0.0431i -0.0165 + 0.0903i -0.0126 - 0.0091i 0.0046 + 0.0017i 0.0123 + 0.0063i
 -0.0839 - 0.3463i -0.0855 + 0.0435i 0.0378 - 0.0130i 0.0601 - 0.1711i 0.0415 + 0.0132i -0.0039 + 0.0164i
 0.0785 + 0.0716i 0.1736 + 0.5096i 0.1411 - 0.0685i -0.0243 - 0.0350i 0.0635 + 0.0619i -0.0657 - 0.0361i
 -0.0186 - 0.0442i 0.1033 - 0.0718i 0.5206 + 0.3805i 0.0218 - 0.0062i -0.0456 - 0.0184i 0.1181 + 0.0146i
 -0.1378 - 0.0696i 0.0381 - 0.0038i -0.0519 - 0.0213i -0.0308 - 0.2770i -0.0827 + 0.0101i 0.0493 + 0.0199i
 -0.0513 - 0.0317i 0.0348 - 0.0701i -0.0565 + 0.0618i 0.0977 + 0.0556i 0.1105 + 0.5470i 0.1684 - 0.0619i
 0.0352 + 0.0556i -0.0315 + 0.0507i -0.0060 - 0.1064i -0.0463 - 0.0183i 0.1219 - 0.0793i 0.4954 + 0.4464i

SG.S22 =

Columns 1 through 6

0.1645 + 0.0258i 0.0108 - 0.0156i -0.0171 + 0.0053i -0.0013 - 0.0065i -0.0024 + 0.0043i 0.0047 + 0.0033i
 -0.0242 - 0.0069i 0.3880 - 0.1521i -0.1455 + 0.5468i 0.0729 - 0.1163i -0.0808 + 0.1253i 0.0742 - 0.1486i
 0.0020 + 0.0141i -0.0931 + 0.5254i 0.3451 + 0.6122i -0.0017 - 0.0634i -0.0558 + 0.0049i 0.1153 - 0.0616i
 -0.0193 + 0.0338i -0.0543 - 0.0529i -0.0669 + 0.0419i -0.7058 + 0.1501i 0.0206 + 0.0359i 0.0141 - 0.0034i
 -0.0029 - 0.0145i 0.0553 + 0.0424i -0.0415 + 0.0685i 0.1012 - 0.0587i -0.0077 + 0.1148i 0.0895 + 0.0083i
 -0.0098 + 0.0025i -0.1233 - 0.0578i -0.0721 - 0.0482i -0.0302 - 0.0098i 0.0702 + 0.0072i 0.1839 + 0.2716i
 -0.0062 + 0.0049i -0.0301 - 0.0050i 0.0248 - 0.0257i 0.2053 + 0.2791i -0.0579 + 0.0177i 0.0165 + 0.0135i
 0.0041 + 0.0022i -0.0096 + 0.0121i -0.0156 - 0.0375i -0.0843 + 0.0536i -0.0077 - 0.0240i -0.0359 + 0.0012i
 0.0032 - 0.0040i 0.0133 - 0.0394i 0.0193 - 0.0282i 0.0481 + 0.0149i -0.0320 - 0.0061i 0.0387 - 0.0759i
 0.8187 - 0.5473i -0.0267 + 0.0227i 0.0209 - 0.0030i -0.0208 - 0.0062i 0.0060 - 0.0067i -0.0047 - 0.0034i
 -0.0432 + 0.0233i -0.4787 + 0.2866i 0.1515 - 0.2418i -0.0412 - 0.2490i 0.1544 - 0.0817i -0.0615 + 0.0504i
 0.0255 - 0.0086i 0.2481 - 0.2248i -0.0427 + 0.0329i -0.0369 - 0.0035i -0.0185 + 0.0225i 0.0320 - 0.0065i
 -0.0196 + 0.0063i -0.0499 - 0.0856i 0.0835 + 0.1194i -0.4530 + 0.1006i 0.0341 - 0.0125i -0.0135 - 0.0161i
 -0.0013 - 0.0145i 0.0007 - 0.0438i 0.0072 + 0.0475i 0.0595 - 0.0770i 0.1574 - 0.0818i -0.0458 - 0.0362i
 -0.0014 + 0.0119i 0.0363 + 0.0386i -0.0234 - 0.0257i -0.0172 + 0.0247i -0.0479 - 0.0443i 0.0080 + 0.0238i
 -0.0042 - 0.0051i -0.0125 - 0.0102i 0.0569 - 0.0226i -0.0861 + 0.0020i -0.0152 - 0.0519i -0.0220 + 0.0114i
 -0.0008 + 0.0013i -0.0102 + 0.0050i -0.0076 + 0.0368i 0.0098 - 0.0181i 0.0162 + 0.0325i -0.0391 - 0.0184i
 0.0030 - 0.0026i -0.0024 - 0.0041i 0.0051 - 0.0251i 0.0114 + 0.0257i 0.0341 - 0.0145i -0.0037 + 0.0081i

Columns 7 through 12

-0.0073 - 0.0087i 0.0030 + 0.0040i 0.0011 - 0.0034i 0.8186 - 0.5474i -0.0173 + 0.0236i 0.0032 - 0.0034i
 0.0184 - 0.0734i 0.0649 + 0.0586i -0.0419 - 0.0516i -0.0325 + 0.0031i -0.4458 + 0.3192i -0.1605 - 0.2282i
 -0.0472 - 0.0333i 0.0102 + 0.0007i -0.0344 - 0.0613i 0.0119 + 0.0102i 0.2287 - 0.1605i -0.0761 + 0.0268i
 -0.2525 + 0.2505i -0.0147 - 0.0245i 0.0105 - 0.0072i -0.0169 + 0.0333i -0.1799 - 0.0916i 0.1684 + 0.1218i
 -0.0283 - 0.0304i -0.0094 - 0.0049i -0.0077 - 0.0323i -0.0049 - 0.0156i -0.0724 - 0.1225i 0.0137 - 0.0014i
 0.0194 - 0.0086i 0.0025 - 0.0213i 0.0870 + 0.0646i -0.0072 + 0.0069i 0.0234 + 0.0596i -0.0054 - 0.0348i
 -0.7044 - 0.8271i 0.0759 - 0.0231i -0.0287 - 0.0025i -0.0049 + 0.0039i -0.0263 + 0.0148i -0.0239 + 0.0010i
 0.0733 - 0.0456i -0.0006 + 0.1067i 0.0619 + 0.0275i 0.0045 + 0.0025i 0.0128 - 0.0281i 0.0299 + 0.0353i
 -0.0097 - 0.0043i 0.0588 - 0.0257i 0.1521 + 0.2764i 0.0012 - 0.0044i -0.0122 + 0.0125i 0.0053 - 0.0128i
 -0.0044 + 0.0069i -0.0026 - 0.0066i -0.0021 + 0.0030i -0.0397 + 0.1625i -0.0024 - 0.0099i 0.0045 + 0.0020i
 -0.0702 - 0.0622i -0.0441 - 0.0939i 0.0132 + 0.0411i -0.0320 + 0.0137i -0.2974 + 0.1347i 0.4154 - 0.3588i
 -0.0502 + 0.0225i 0.0055 - 0.0033i -0.0017 - 0.0156i 0.0232 - 0.0063i 0.5223 - 0.4038i 0.3993 - 0.5491i
 0.0500 + 0.0852i -0.0059 + 0.0798i -0.0221 - 0.0225i -0.0125 - 0.0067i 0.0891 - 0.0663i 0.0164 + 0.0849i
 -0.0032 + 0.0097i 0.0092 - 0.0123i 0.0183 + 0.0316i 0.0031 - 0.0105i 0.0235 - 0.0843i 0.0646 - 0.0344i
 -0.0124 - 0.0041i -0.0222 - 0.0206i 0.0012 - 0.0027i -0.0035 + 0.0079i 0.0227 + 0.1190i 0.0389 + 0.0934i

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

```

0.5711 + 0.0241i -0.0344 + 0.0452i -0.0066 - 0.0041i -0.0039 - 0.0082i -0.0012 - 0.0376i 0.0155 + 0.0149i
-0.0477 + 0.0815i -0.2262 + 0.0952i 0.0504 + 0.0436i -0.0008 + 0.0008i 0.0088 + 0.0424i -0.0468 - 0.0041i
-0.0082 - 0.0206i 0.0419 + 0.0416i 0.0026 - 0.0175i 0.0033 - 0.0014i -0.0274 - 0.0400i 0.0379 - 0.0019i

```

Columns 13 through 18

```

-0.0218 - 0.0143i 0.0017 - 0.0076i -0.0004 - 0.0015i -0.0048 - 0.0025i -0.0019 - 0.0046i -0.0004 + 0.0009i
0.0106 - 0.1321i 0.0632 + 0.0038i -0.0228 + 0.0469i 0.0223 - 0.0104i -0.0241 - 0.0295i 0.0032 + 0.0124i
-0.0802 + 0.0164i -0.0818 + 0.0110i 0.0413 - 0.0354i -0.0064 + 0.0019i 0.0116 + 0.0359i -0.0257 - 0.0322i
-0.4508 + 0.1067i 0.0162 - 0.0472i 0.0024 - 0.0054i 0.0229 - 0.0586i 0.0083 + 0.0151i -0.0034 - 0.0152i
0.0449 - 0.0324i 0.1518 - 0.0876i -0.0627 - 0.0359i 0.0272 - 0.0211i -0.0027 + 0.0201i 0.0121 + 0.0286i
-0.0091 - 0.0158i -0.0345 - 0.0339i 0.0114 + 0.0238i 0.0019 + 0.0089i -0.0237 - 0.0376i 0.0058 - 0.0006i
0.0383 + 0.0140i -0.0002 - 0.0002i -0.0133 + 0.0016i 0.5511 + 0.0183i -0.0589 + 0.0718i 0.0110 - 0.0336i
0.0101 + 0.0535i 0.0028 - 0.0038i -0.0363 - 0.0123i -0.0482 + 0.0521i -0.2258 + 0.0888i 0.0427 + 0.0540i
0.0172 - 0.0112i 0.0398 - 0.0001i -0.0065 + 0.0080i 0.0035 - 0.0101i 0.0498 + 0.0454i 0.0019 - 0.0214i
0.0204 + 0.0081i 0.0017 + 0.0075i -0.0001 + 0.0022i 0.0099 + 0.0001i 0.0034 + 0.0051i 0.0001 - 0.0015i
0.0395 - 0.0098i 0.0705 + 0.0036i -0.0920 - 0.0060i 0.0374 + 0.0353i 0.0460 + 0.0219i -0.0417 + 0.0236i
-0.0290 - 0.0037i 0.0053 + 0.0071i -0.0816 - 0.0077i 0.0106 - 0.0080i 0.0020 + 0.0060i -0.0155 - 0.0028i
0.7736 - 0.2099i -0.0153 + 0.1201i -0.0262 - 0.0388i 0.0973 - 0.2089i 0.0315 - 0.0483i 0.0478 + 0.0123i
-0.0141 + 0.0789i -0.1490 + 0.2234i 0.0826 + 0.0371i 0.0232 - 0.0213i -0.0592 + 0.1128i -0.0022 - 0.0391i
-0.0015 - 0.0347i 0.0837 + 0.0366i 0.1796 + 0.1783i 0.0312 + 0.0135i 0.0049 - 0.0385i 0.0367 + 0.0394i
-0.1843 - 0.1053i 0.0100 - 0.0691i -0.0280 + 0.0499i 0.7634 - 0.0513i -0.0415 + 0.0879i -0.0001 - 0.0430i
-0.0010 - 0.0628i 0.0992 + 0.0467i -0.0575 - 0.0408i -0.0070 + 0.0390i -0.1786 + 0.1500i 0.0858 + 0.0642i
-0.0133 + 0.0512i -0.0529 - 0.0399i 0.0258 - 0.0258i -0.0197 - 0.0054i 0.0713 + 0.0583i 0.1286 + 0.1798i

```

STEP 11: FIELDS

```

delta =
0
0
0
0
1
0
0
0
0
0
ate = [0.5;-0.86603;0]
atm = [-0.43301;-0.25;0.86603]
EP = [0.35355-0.30619i;-0.61237-0.17678i;0+0.61237i]

```

```

escr =
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.3536 - 0.3062i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
-0.6124 - 0.1768i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i

```

```

csrc =
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.3536 - 0.3062i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
-0.6124 - 0.1768i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i
0.0000 + 0.0000i

```

```

ceref =
-0.0187 - 0.0155i
0.0486 - 0.0467i
0.0016 + 0.0012i
0.0324 - 0.0229i
-0.1606 - 0.0348i
-0.0089 + 0.0156i
0.0020 + 0.0105i
0.0076 + 0.0187i
-0.0027 - 0.0129i
-0.0077 - 0.0106i
0.0184 + 0.0323i
-0.0267 - 0.0070i
-0.0286 + 0.0472i
0.2335 + 0.0138i
0.0243 + 0.0164i
0.0435 - 0.0181i
0.0183 + 0.0146i
-0.0062 + 0.0011i

```

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)

```
ctrn =  
0.0015 - 0.0016i  
-0.0583 + 0.0256i  
-0.0245 - 0.0098i  
0.0060 + 0.0210i  
0.3040 + 0.0664i  
-0.0054 - 0.0632i  
-0.0123 - 0.0262i  
-0.0323 - 0.0534i  
0.0169 + 0.0455i  
-0.0024 + 0.0011i  
0.0356 + 0.0282i  
-0.0230 - 0.0071i  
0.0610 - 0.0011i  
0.0523 - 0.2913i  
-0.0645 - 0.0027i  
-0.0170 - 0.0165i  
-0.0420 + 0.0298i  
0.0258 - 0.0234i
```

```
eref =  
-0.0187 - 0.0155i  
0.0486 - 0.0467i  
0.0016 + 0.0012i  
0.0324 - 0.0229i  
-0.1606 - 0.0348i  
-0.0089 + 0.0156i  
0.0020 + 0.0105i  
0.0076 + 0.0187i  
-0.0027 - 0.0129i  
-0.0077 - 0.0106i  
0.0184 + 0.0323i  
-0.0267 - 0.0070i  
-0.0286 + 0.0472i  
0.2335 + 0.0138i  
0.0243 + 0.0164i  
0.0435 - 0.0181i  
0.0183 + 0.0146i  
-0.0062 + 0.0011i
```

```
etrn =  
0.0015 - 0.0016i  
-0.0583 + 0.0256i  
-0.0245 - 0.0098i  
0.0060 + 0.0210i  
0.3040 + 0.0664i  
-0.0054 - 0.0632i  
-0.0123 - 0.0262i  
-0.0323 - 0.0534i  
0.0169 + 0.0455i  
-0.0024 + 0.0011i  
0.0356 + 0.0282i  
-0.0230 - 0.0071i  
0.0610 - 0.0011i  
0.0523 - 0.2913i  
-0.0645 - 0.0027i  
-0.0170 - 0.0165i  
-0.0420 + 0.0298i  
0.0258 - 0.0234i
```

```
rx =  
-0.0187 - 0.0155i  
0.0486 - 0.0467i  
0.0016 + 0.0012i  
0.0324 - 0.0229i  
-0.1606 - 0.0348i  
-0.0089 + 0.0156i  
0.0020 + 0.0105i  
0.0076 + 0.0187i  
-0.0027 - 0.0129i
```

```
ry =  
-0.0077 - 0.0106i  
0.0184 + 0.0323i  
-0.0267 - 0.0070i  
-0.0286 + 0.0472i  
0.2335 + 0.0138i  
0.0243 + 0.0164i  
0.0435 - 0.0181i  
0.0183 + 0.0146i  
-0.0062 + 0.0011i
```

```
rz =  
0.0213 - 0.0218i  
-0.0078 + 0.0512i  
0.0103 - 0.0388i  
0.0120 + 0.0300i  
-0.0386 - 0.0403i  
0.0123 + 0.0069i  
-0.0197 - 0.0147i  
-0.0087 + 0.0157i  
0.0039 + 0.0002i
```

```
tx =  
0.0015 - 0.0016i  
-0.0583 + 0.0256i  
-0.0245 - 0.0098i  
0.0060 + 0.0210i  
0.3040 + 0.0664i  
-0.0054 - 0.0632i  
-0.0123 - 0.0262i  
-0.0323 - 0.0534i  
0.0169 + 0.0455i
```

RCWA Benchmark Data
3x3 Spatial Harmonics (oblique incidence)



```
ty =  
-0.0024 + 0.0011i  
0.0356 + 0.0282i  
-0.0230 - 0.0071i  
0.0610 - 0.0011i  
0.0523 - 0.2913i  
-0.0645 - 0.0027i  
-0.0170 - 0.0165i  
-0.0420 + 0.0298i  
0.0258 - 0.0234i
```

```
tz =  
0.0023 + 0.0021i  
-0.0036 - 0.0406i  
0.0187 + 0.0057i  
-0.0261 - 0.0235i  
-0.1294 + 0.0394i  
0.0133 - 0.0012i  
0.0078 + 0.0241i  
0.0014 + 0.0288i  
0.0069 - 0.0045i
```

===== STEP 12: DIFFRACTION EFFICIENCIES

```
R =  
0 0 0  
0 0.0848 0.0011  
0 0.0025 0.0004
```

```
T =  
0.0000 0.0149 0.0055  
0.0222 0.7851 0.0283  
0.0053 0.0348 0.0150
```

```
REF = 0.088768  
TRN = 0.91123
```

===== STEP 13: CONSERVATION

```
REF = 8.8768%  
TRN = 91.1232%  
-----  
CON = 100%
```