



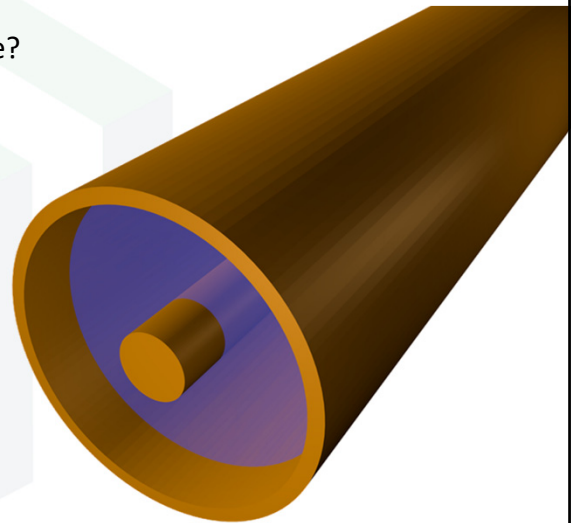
Electromagnetics:  
Electromagnetic Field Theory

## Example 4 – Magnetic Field Outside of a Coaxial Cable

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### Example #1 – Magnetic Field Outside of Coaxial Cable

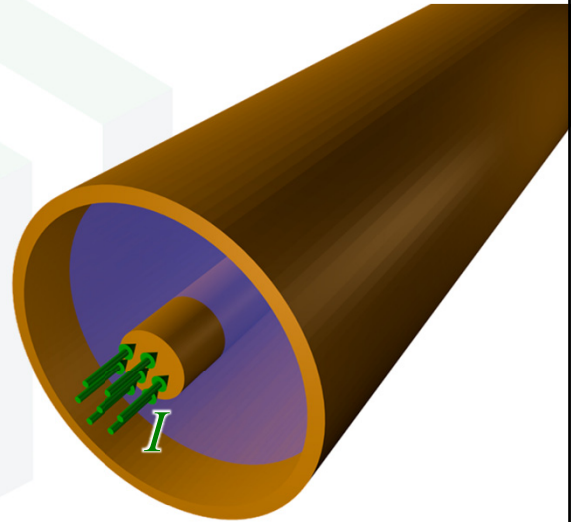
What is the magnetic field outside of a coaxial cable?



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## Example #1 – Magnetic Field Outside of Coaxial Cable

Let a current  $I$  flow through the inner conductor.

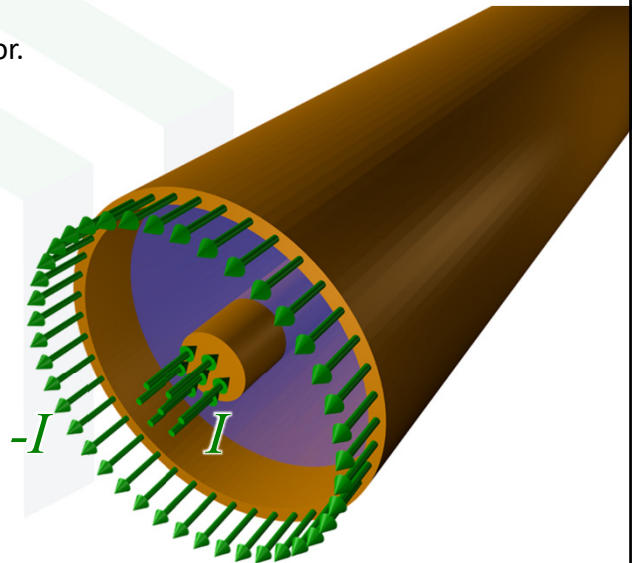


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## Example #1 – Magnetic Field Outside of Coaxial Cable

Let a current  $I$  flow through the inner conductor.

The same current  $I$  returns through the outer conductor.



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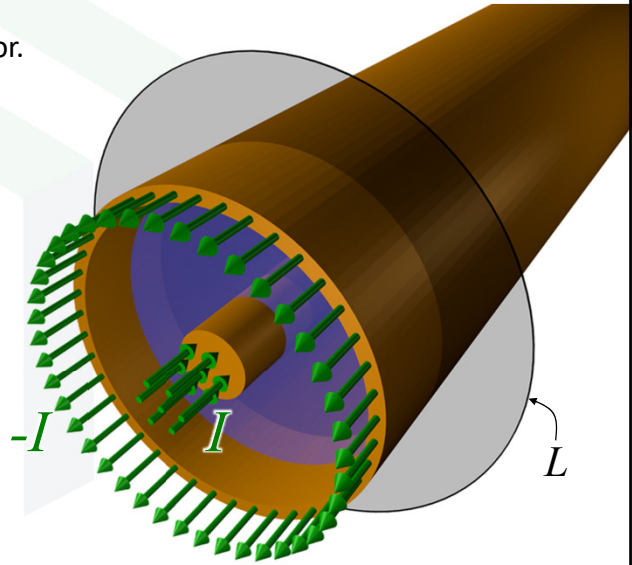
## Example #1 – Magnetic Field Outside of Coaxial Cable

Let a current  $I$  flow through the inner conductor.

The same current  $I$  returns through the outer conductor.

Ampere's circuit law encloses zero net current.

$$I - I = 0 = \oint_L \vec{H} \cdot d\vec{\ell}$$



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## Example #1 – Magnetic Field Outside of Coaxial Cable

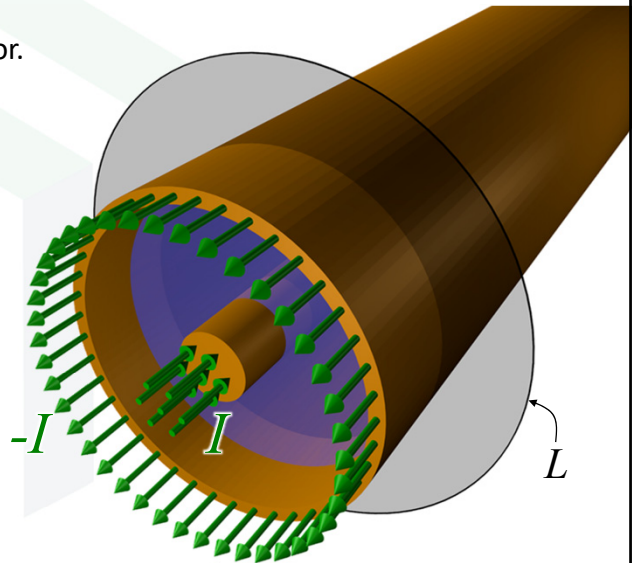
Let a current  $I$  flow through the inner conductor.

The same current  $I$  returns through the outer conductor.

Ampere's circuit law encloses zero net current.

$$I - I = 0 = \oint_L \vec{H} \cdot d\vec{\ell}$$

It is concluded that  $\vec{H} = 0$  outside of the coax.



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