Maxwell's Equations

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$$\oint_S \vec{\mathbf{B}} \cdot d\vec{\mathbf{A}} = 0.$$

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Displacement Current

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- Let's work out an example.

Example - Displacement Current

- A parallel-plate capacitor has closely spaced circular plates of radius R. Current I is flowing onto the positive plate. Note: The surface S is defined by a circle (radius $r < R$) centered along the axis of the plates. Find

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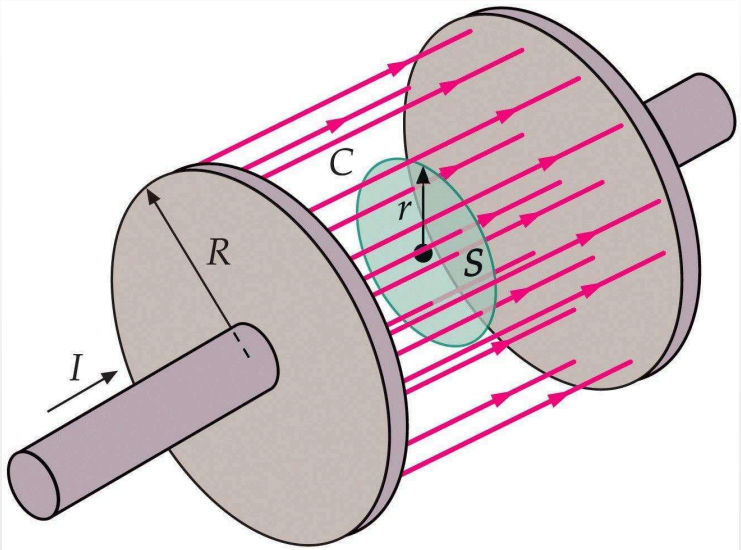

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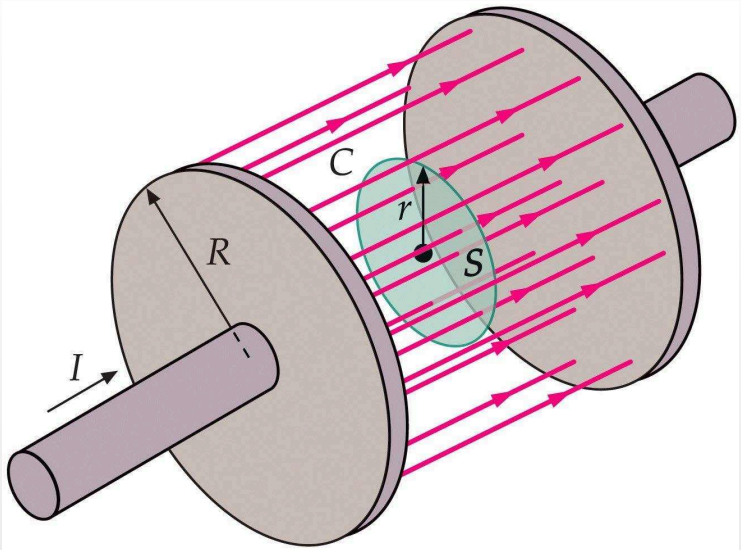

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  (a) the displacement current through the surface S passing between the plates by directly computing $\frac{d\Phi_E}{dt}$ through S.

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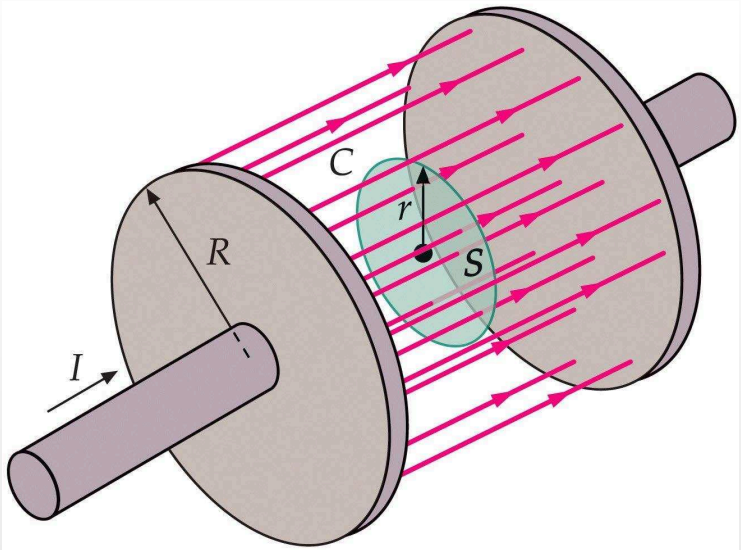

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  (a) Calculate Φ_E.

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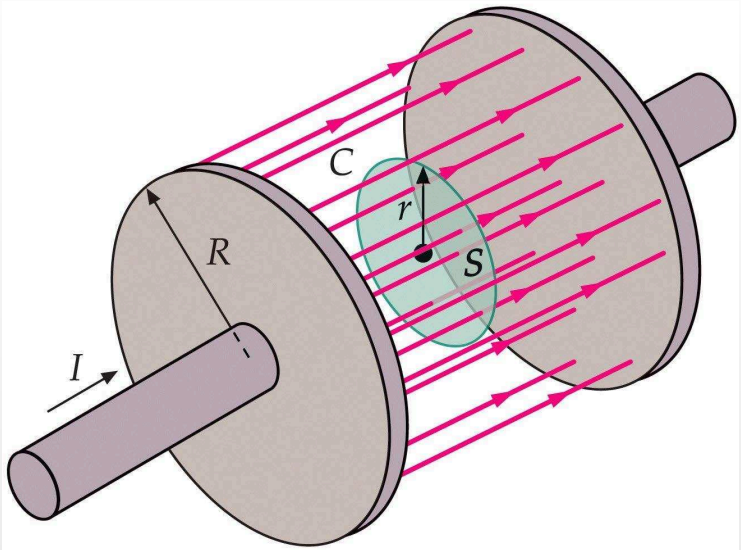

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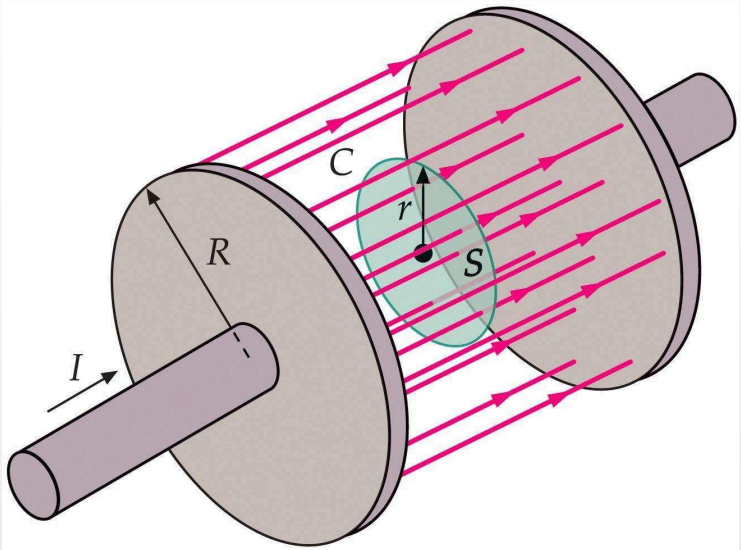

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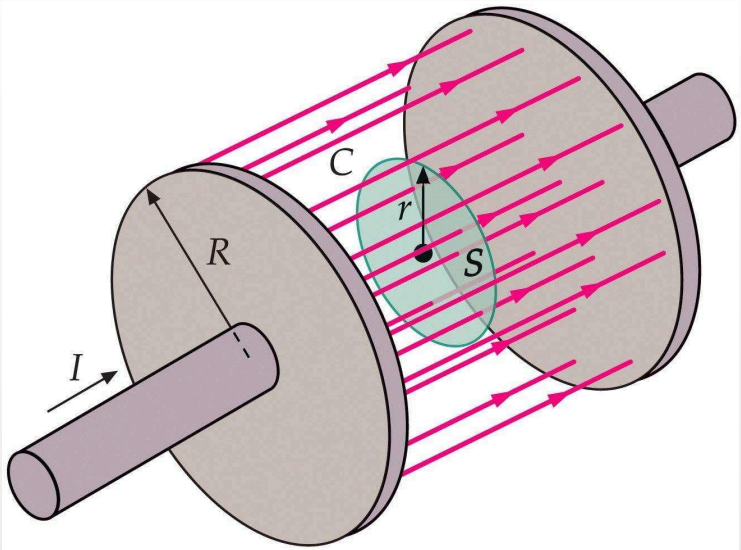

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$$\Phi_E = \frac{q\, r^2}{R^2\, \varepsilon_0}$$

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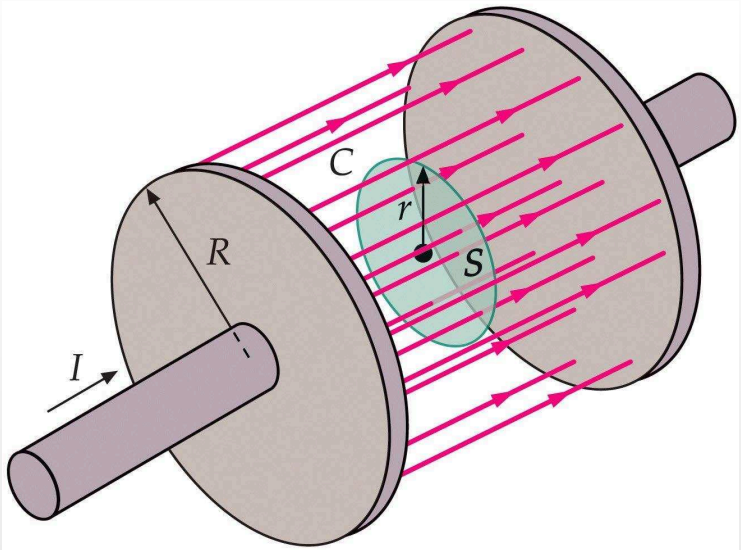

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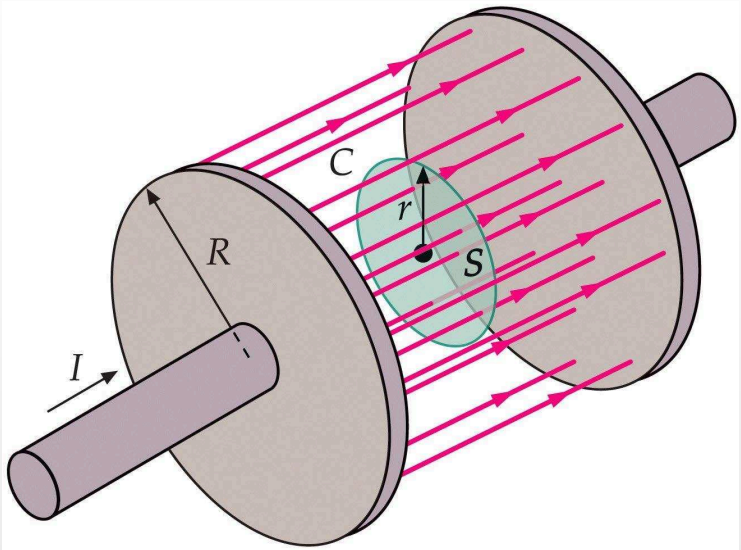

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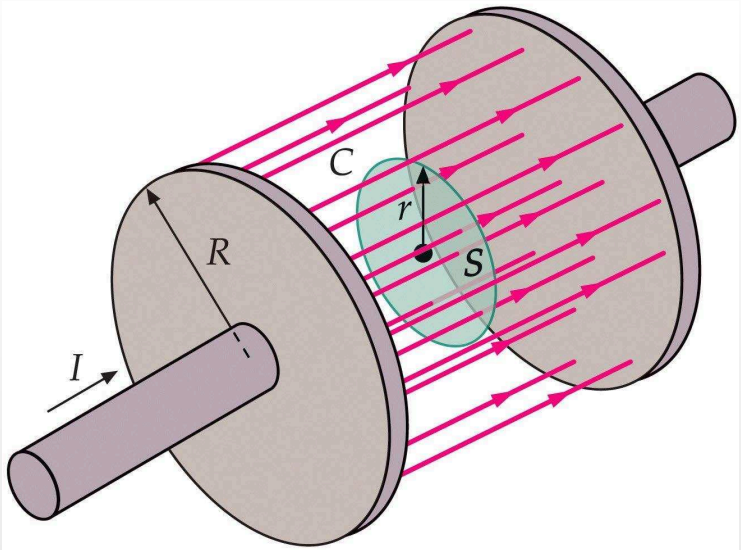

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  (b) the magnetic field B at a point r from the axis of the plates when the current into the positive plate is I.

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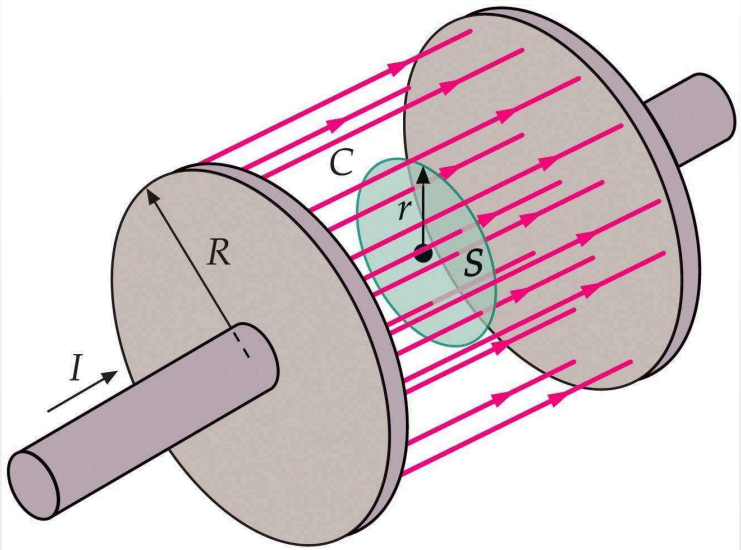

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  (b) We've already calculated I_d through S.

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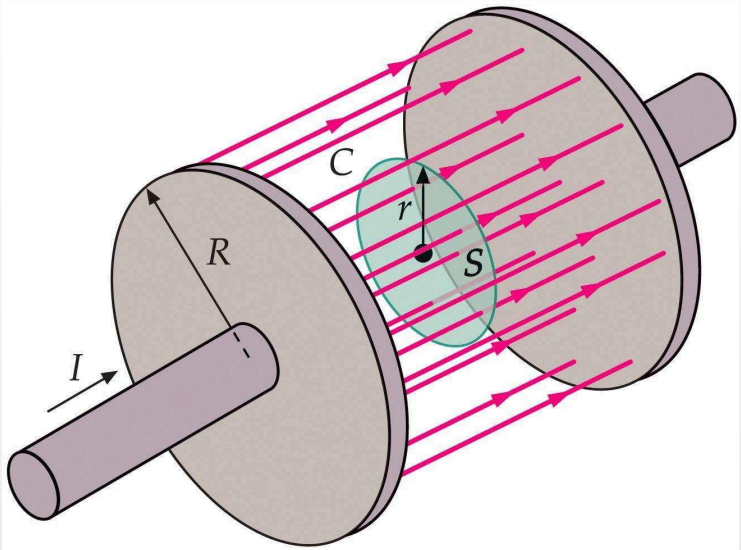

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  (b) Apply Ampere's Law to surface S.

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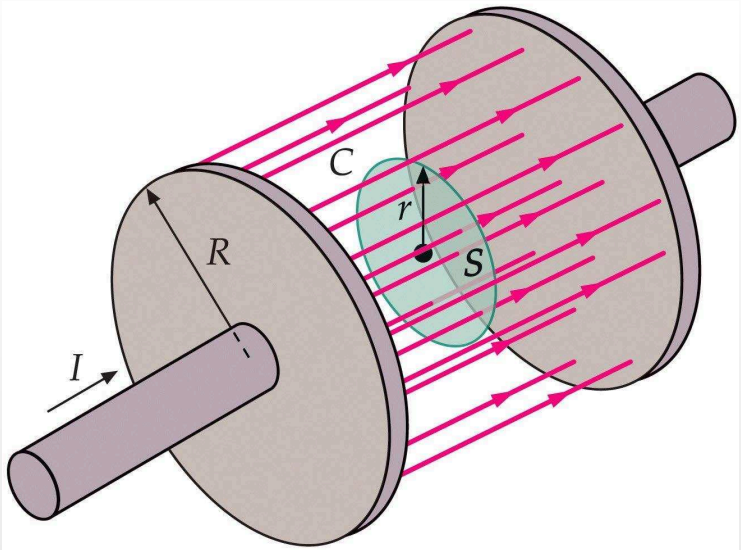

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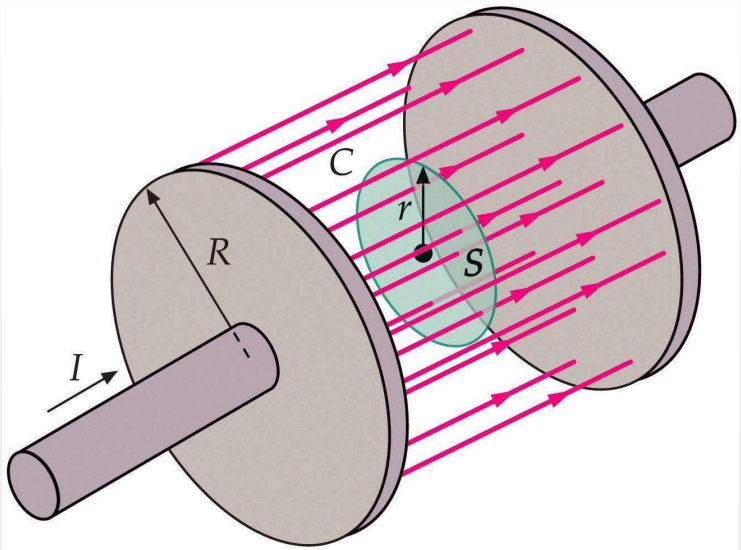

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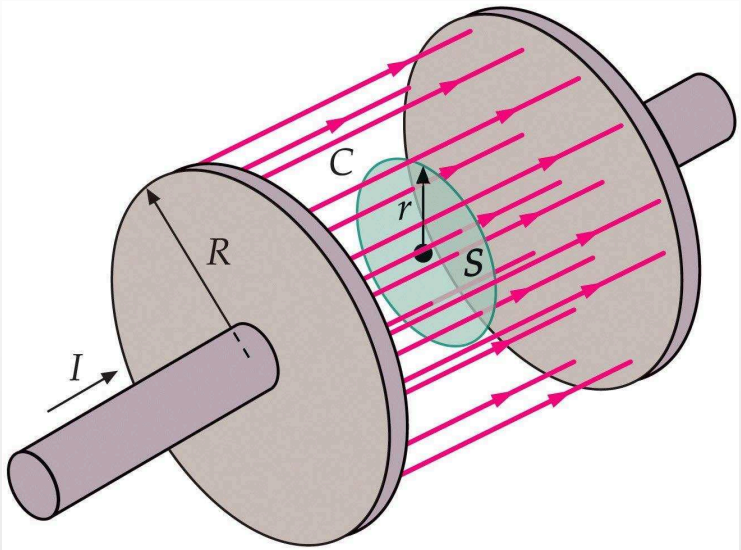

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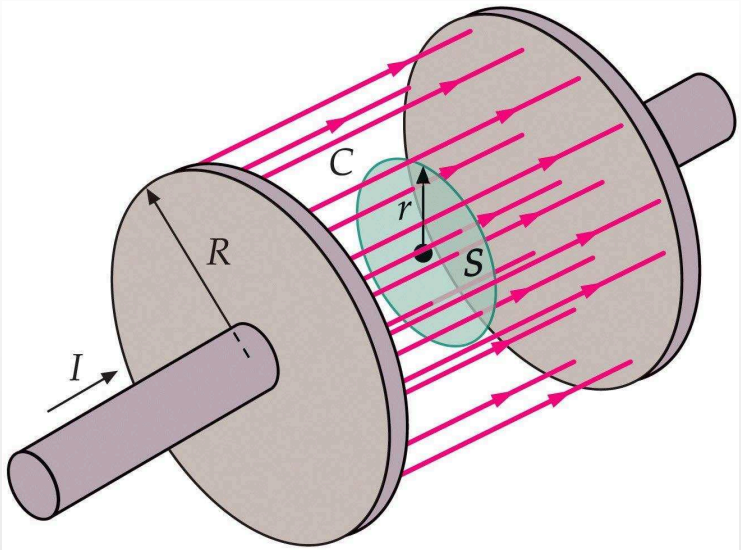

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- Maxwell's equations drastically changed the way people viewed light.

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  Good bye - Video Clip.