

CHOOSE TWO PROBLEMS. MARK CLEARLY WHICH ONES YOU HAVE CHOSEN!

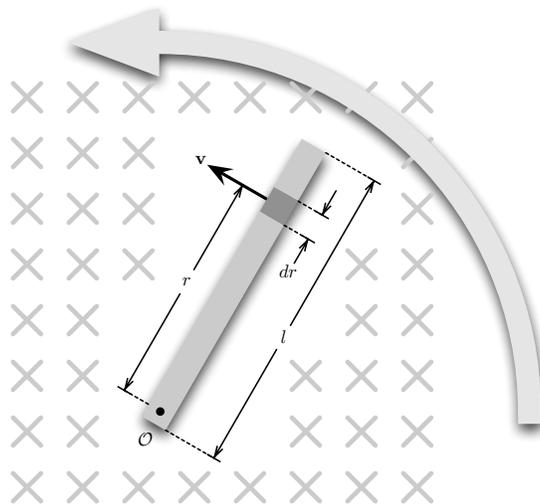
- The figure below, reproduced from Serway, depicts a conductor rotating about a pivot at one end. As you know, emf will be induced by the motion because the conductor's free electrons will be deflected from circular trajectories by the magnetic field. Start with Serway's expression from the differential emf induced by a differential segment of the conductor

$$d\mathcal{E} = Bv dr$$

and arrive at the expression for the induced emf in a conductor rotating about one of its ends in a uniform magnetic field

$$\mathcal{E} = \frac{1}{2}B\omega l^2.$$

Remember that the tangential speed $v = \omega r$.



- A helicopter has blades of length 3.00 m, extending out from a central hub and rotating at 2.00 rev/s. If the vertical component of the Earth's magnetic field is $50.0 \mu\text{T}$, what is the emf induced between the blade tip and the center hub?
- State Lenz's Law in words.

EXTRA CREDIT (1 POINT)

Write Faraday's Law in general form.