

Electromagnetism H.W # ⑫

① Griffiths $\rightarrow$ prob 7.7 to 7.14.

② A square wire of length ' L ', mass ' m ' and resistance ' R ' slides without friction down parallel conducting rails of negligible resistance. The rails are connected to each other at the bottom by a resistanceless rail parallel to the wire, so that the wire and rails form a closed rectangular conducting loop. The plane of the rails make an angle ' θ ' with the horizontal, and a uniform magnetic field ' $\vec{B}$ ' exists throughout the region. Show that the wire acquires a steady-state speed of magnitude

$$v = \frac{mgR \sin \theta}{B^2 L^2 \cos^2 \theta}$$

(problem taken from Halliday & Resnick.)

