

**Problem set #10**

**1) Problem 4.28: Hydraulic Capacitor**

**2) Problem 4.31: Perpetual motion?**

**3) Conductor and dielectric**

Consider a thin grounded conducting shell of radius  $a$  surrounded by a concentric spherical dielectric region of radius  $b$  with permittivity  $\varepsilon$ . There is vacuum for  $r > b$ . The entire system is subject to an applied external electric field  $\vec{E} = E_0 \hat{z}$ . Calculate the potential everywhere (i.e. for  $r < a$ ,  $a < r < b$ , and  $r > b$ ) using separation of variables.

**4) Problem 5.4: Magnetic force**

**5) Problem 5.8: Polygon current**