

**Resistive Force on Spheres with  
radius  $r$ , mass  $m$ , and speed  $v$**

$$C_1 r v + C_2 r^2 v^2$$

$$v_{\text{crit}} = C_1 / C_2 r$$

**Condition for terminal velocity:**

$$C_2 r^2 v_{\text{term}}^2 + C_1 r v_{\text{term}} - mg = 0$$

**Regime I:**  $v \ll v_{\text{crit}}$

$$v_{\text{term}} = mg / C_1 r \propto r^2$$

**Regime II:**  $v \gg v_{\text{crit}}$

$$v_{\text{term}} = (mg / C_2 r^2)^{0.5} \propto r^{0.5}$$

**for given density  $\rho$  of the sphere**

$$m = 4\pi\rho r^3 / 3$$