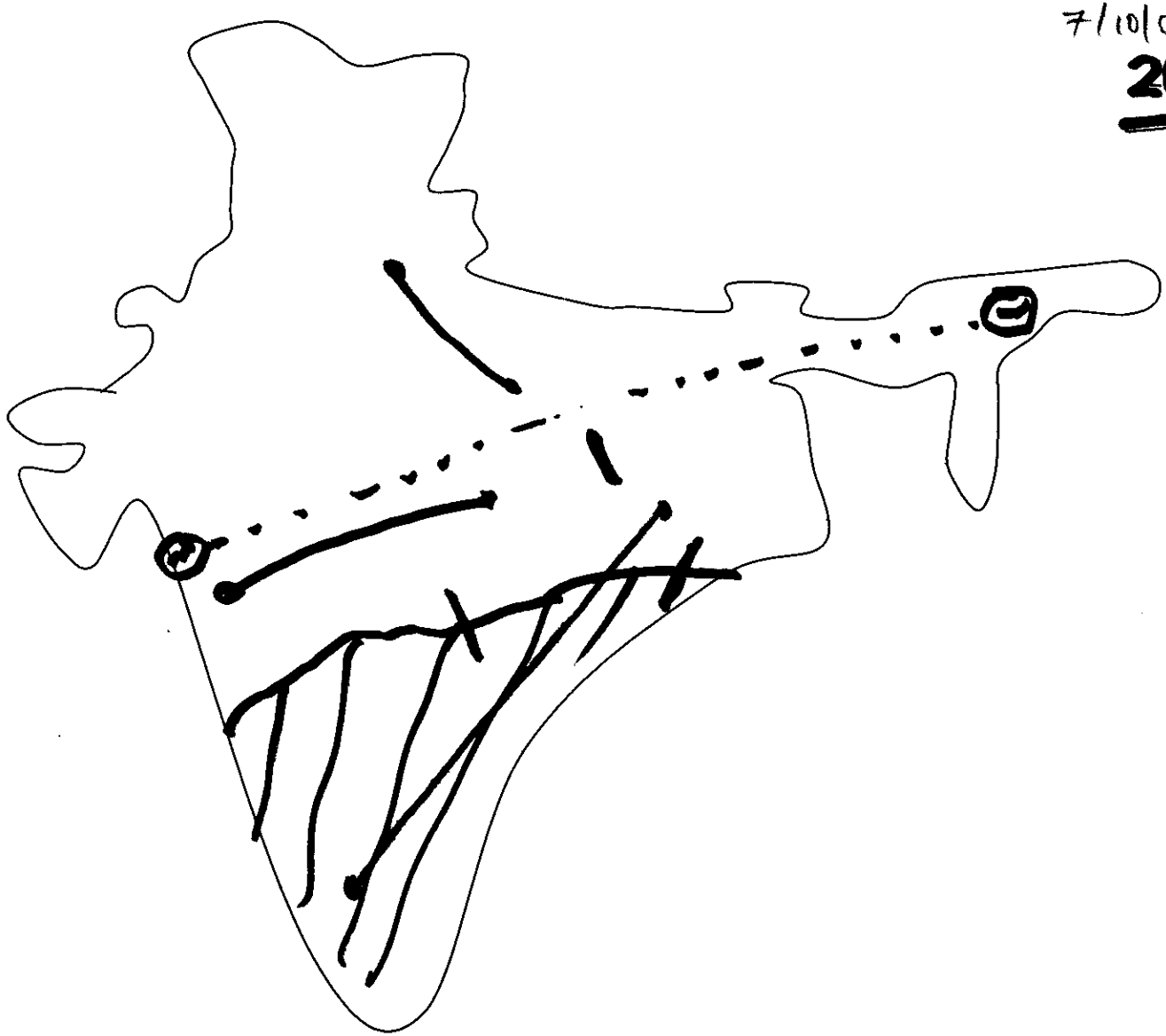
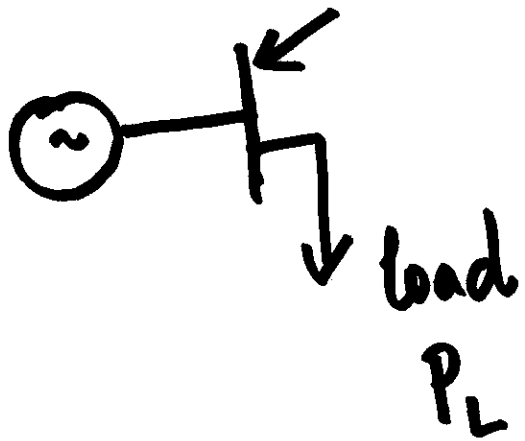
Lec - 2
7/10/09
2009





$$P_L = P_e$$

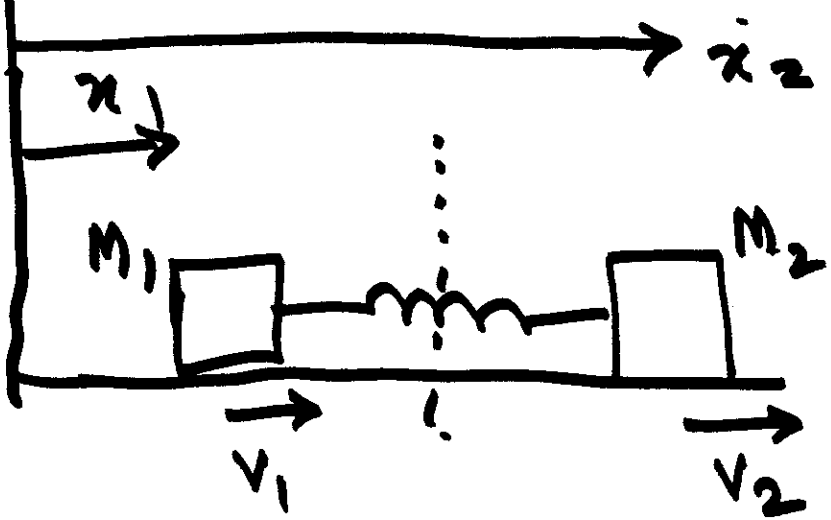
$$\boxed{J\frac{d\omega_m}{dt} = \frac{P_m - P_e}{\omega}}$$

$$\frac{P_m - P_e}{\omega} = 0 \leftarrow \text{STEADY STATE}$$

$$J_1 \frac{d\omega_{m1}}{dt} = \frac{P_{m_1} - P_{e_1}}{\omega_{m1}}$$

$$J_2 \frac{d\omega_{m2}}{dt} = \frac{P_{m_2} - P_{e_2}}{\omega_{m2}.}$$

$$(J_1 + J_2) \frac{d\left(\frac{J_1\omega_{m_1} + J_2\omega_{m_2}}{J_1 + J_2}\right)}{dt} = \frac{P_{m_1}}{\omega_{m_1}} + \frac{P_{m_2}}{\omega_{m_2}} - \frac{P_{e_1}}{\omega_{m_1}} - \frac{P_{e_2}}{\omega_{m_2}}$$

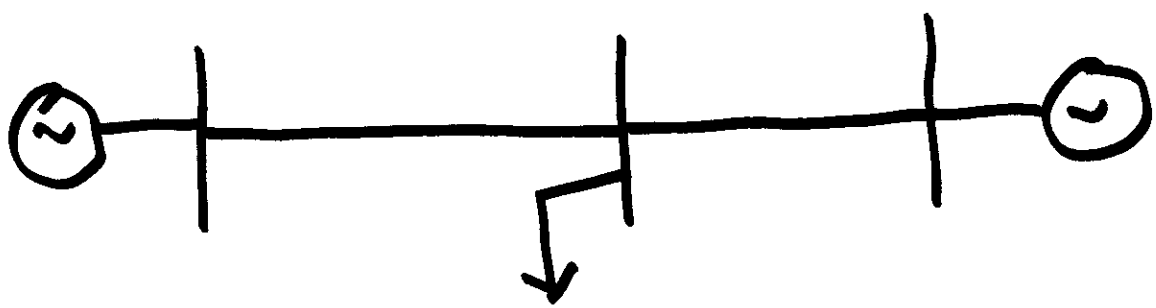


$$V_{COM} = \frac{M_1 V_1 + M_2 V_2}{M_1 + M_2}.$$

$$x_{COM} = \frac{M_1 x_1 + M_2 x_2}{x_1 + x_2}$$

$$P_m^{(\omega)} - P_e(\omega) = 0$$

"governor"



IN STEADY STATE

$$\frac{P_{m1}}{\omega_{m1}} + \frac{P_{m2}}{\omega_{m2}} = \frac{P_{e1}}{\omega_{m1}} + \frac{P_{e2}}{\omega_{m2}}.$$

$$\underline{\omega_{m1} = \omega_{m2}} \quad - \text{"synchronism"}$$

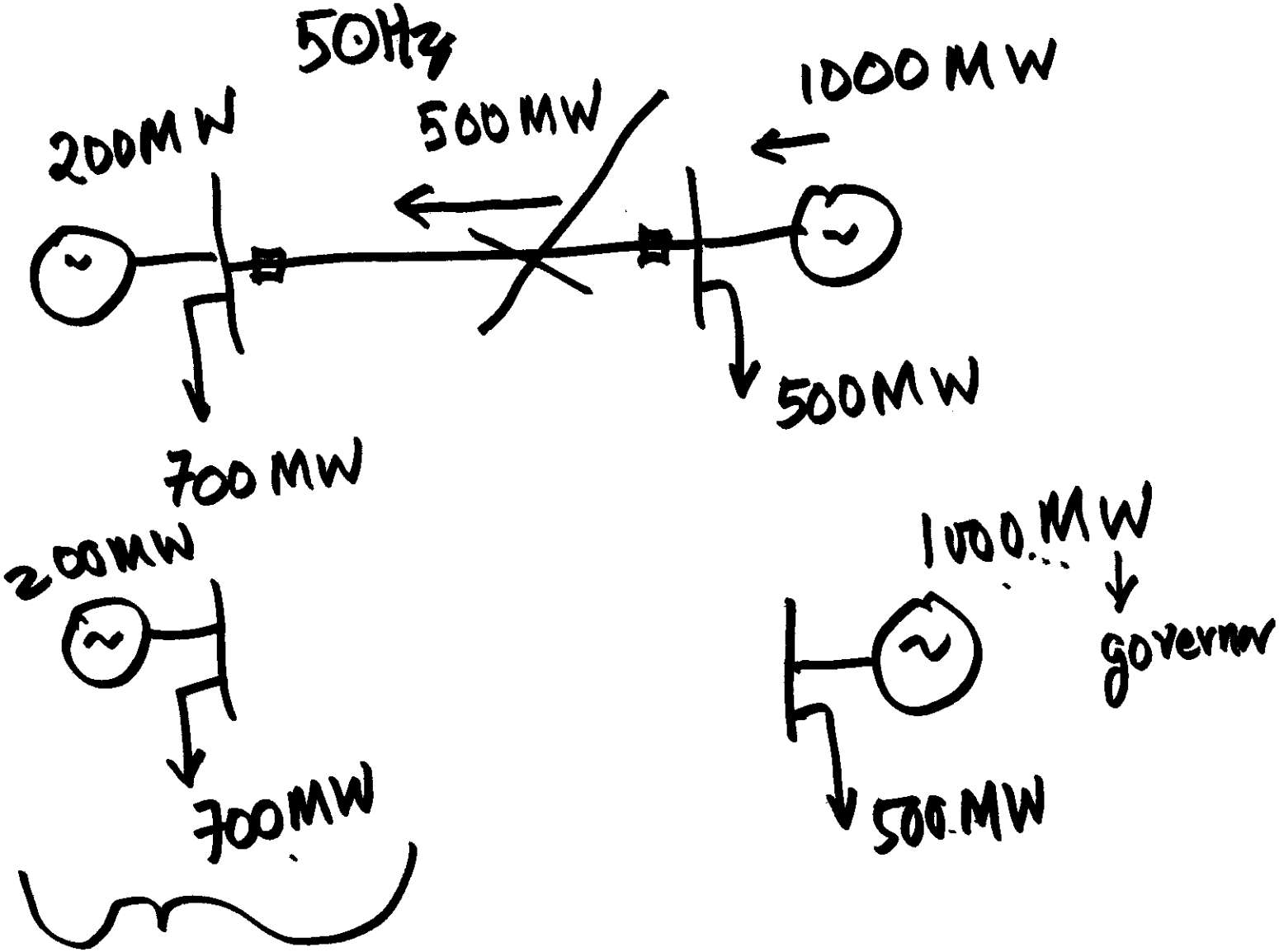
$$P_{m1} + P_{m2} = P_{e1} + P_{e2}.$$

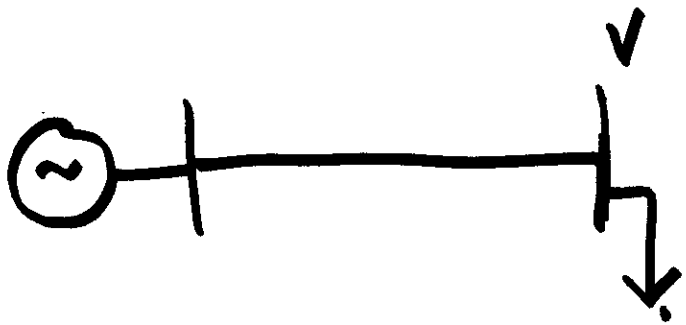
$$P_{e1} + P_{e2} = P_L$$

$$(J_1 + J_2)\frac{d}{dt}(\omega_{COI}) = \frac{(P_{m1} + P_{m2}) - P_L}{\omega_?}.$$

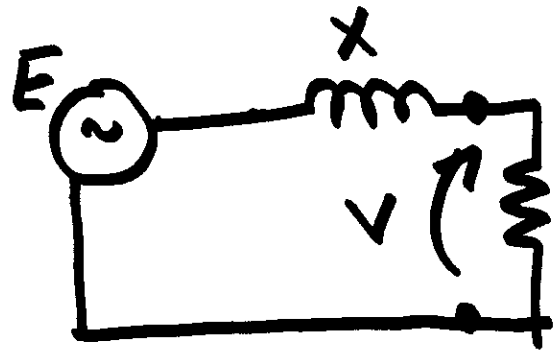
$$P_{m1} + P_{m2} = P_L$$

$$\omega_{COI} = \omega_{m1} = \omega_{m2}.$$


50Hz
200MW
500MW
1000MW
700MW
500MW
200MW
700MW
1000MW
governor
500MW



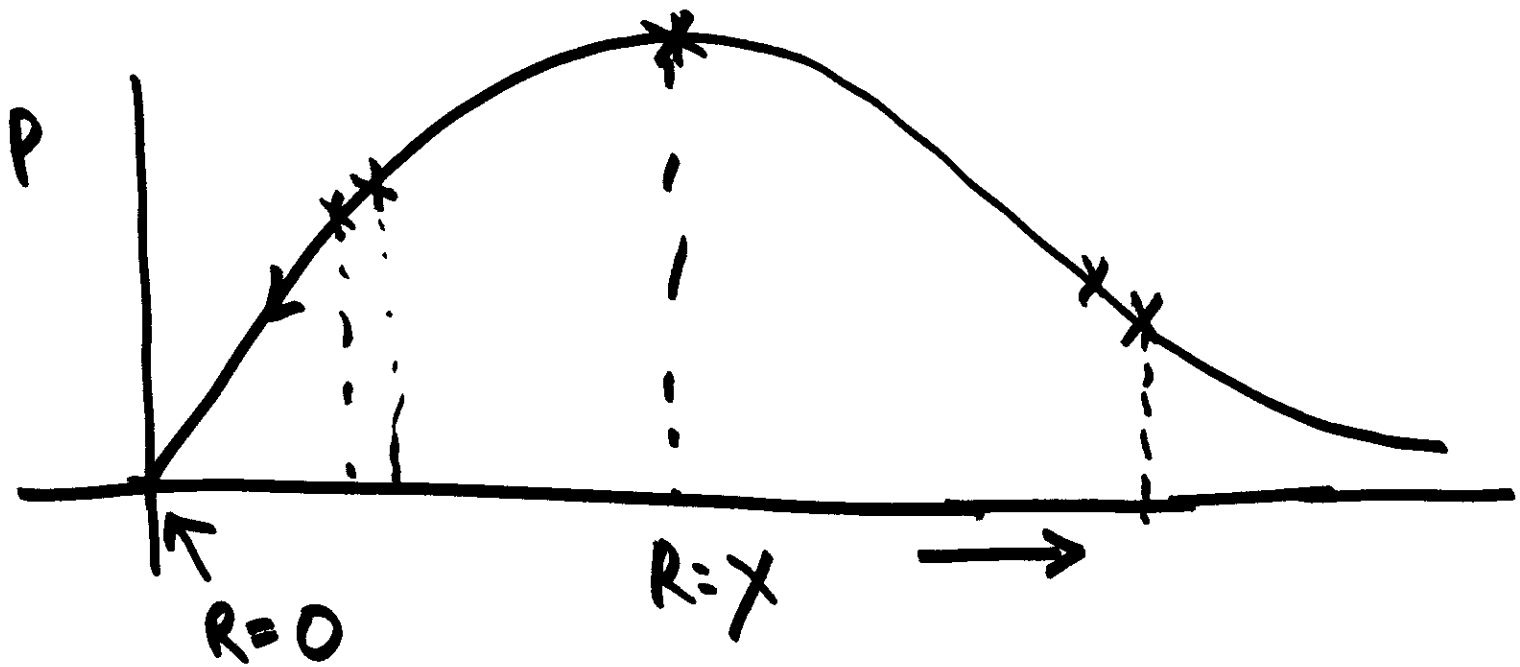
$$V = \frac{E \cdot R}{(R^2 + X^2)^{\frac{1}{2}}}$$



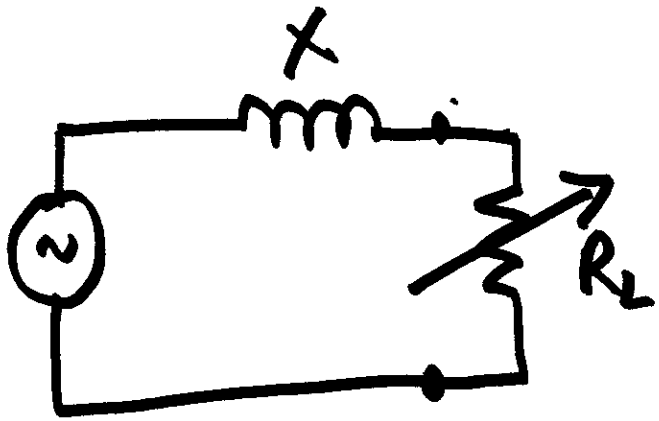
$$\left(\frac{E}{\sqrt{X^2 + R^2}}\right)^2 \cdot R$$

$$= I_L^2 R_L$$

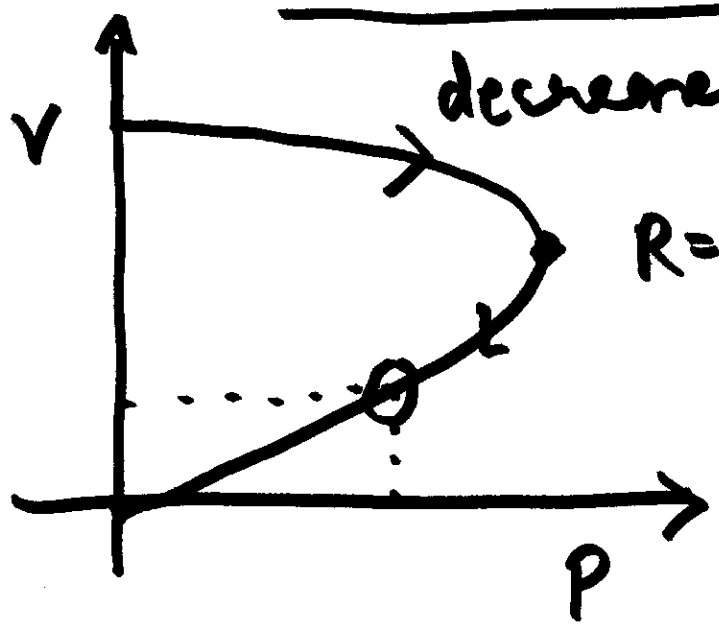
$$P_L = \frac{E^2 \cdot R}{X^2 + R^2}$$

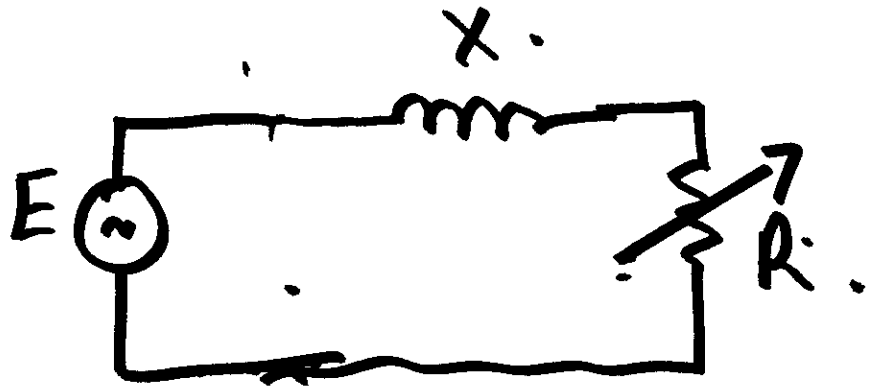


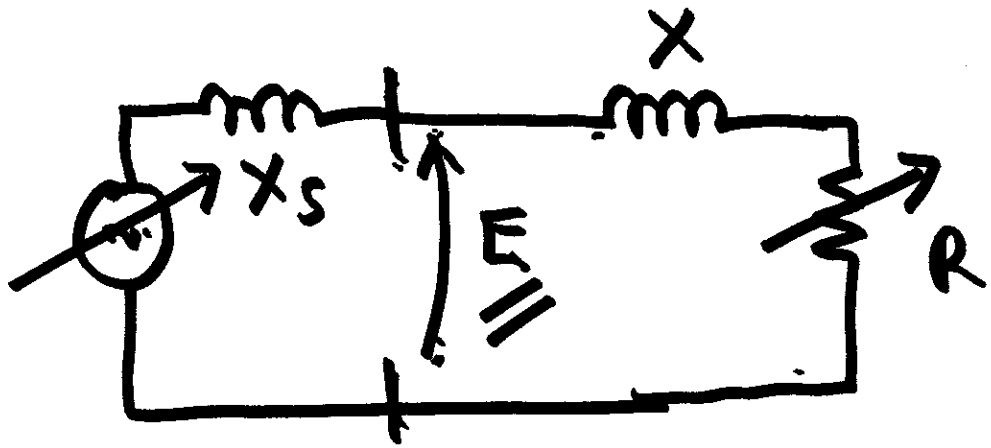
$$P = \frac{E^2 R}{X^2 + R^2}$$



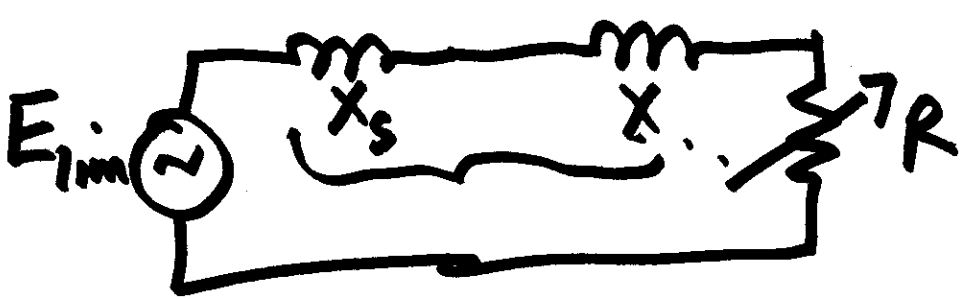
P_L decrease R if $P_L < P_{desired}$







good



} can cause a potential V.S. problem

1. Manual Control
   → Supervision
2. Automatic feedback Controller
3. Emergency Control ←