

Analogs

See hand-out for mechanical and thermal analogs of electrical circuits

Note: Change in equation below ($1/k$ coeff of x_{road} deleted)

Extra-credit problem (from Rizzoni) +2.5%

The mechanical system shown represents a car of :

- Mass $m = 1,500$ kg
- Spring constant $k = 20,000$ N/m
- Shock absorber damping $b =$ (a) $15,000$ N-s/m
& (b) $5,000$ N-s/m

Subject to an abrupt displacement at $t = 0$ of:

- $x_{road} = 10$ cm

The differential equation is:

- $$\frac{m}{k} \frac{d^2 x_{body}(t)}{dt^2} + \frac{b}{k} \frac{dx_{body}(t)}{dt} + x_{body}(t) = x_{road}(t) + \frac{b}{k} \frac{dx_{road}(t)}{dt}$$

- Determine and sketch the body displacement $x(t)$ versus t for cases (a) & (b)

