

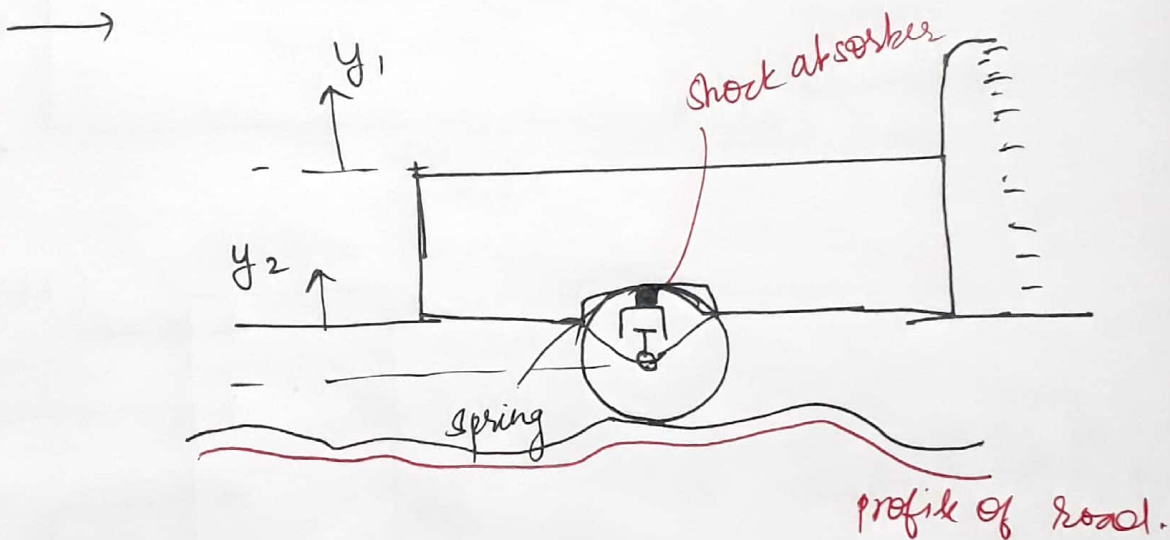
2) Suspension system is illustrated.
→ mass of the vehicle m_1 & mass of wheel is m_2

→ spring constant K_1

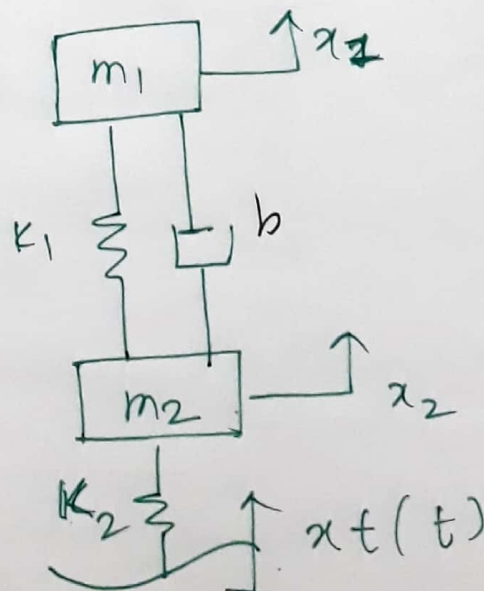
→ Tire had spring constant = k_2

→ Damping constant of shock absorber = b .

Obtain model which represents the vehicle response to bump in road & simulate for 100 sec.



Applying Newton's laws



considering system to be passive.

$$\begin{aligned}
 F - k_1(x_1 - x_2) - b(\dot{x}_1 - \dot{x}_2) &= m_1 \ddot{x}_1 \\
 -F + k_1(x_1 - x_2) + b(\dot{x}_1 - \dot{x}_2) - k_2(x_2 - x_t) &= m_2 \ddot{x}_2
 \end{aligned}$$

Rearranging

$$m_1 \ddot{x}_1 + b(\dot{x}_1 - \dot{x}_2) + k_1(x_1 - x_2) = F$$

$$m_2 \ddot{x}_2 - k_1(x_1 - x_2) - b(\dot{x}_1 - \dot{x}_2) + k_2 x_2 = -F + k_2 x_t$$

Resource :- Advances in ~~science~~ science & Tech
Technology Research Journal.