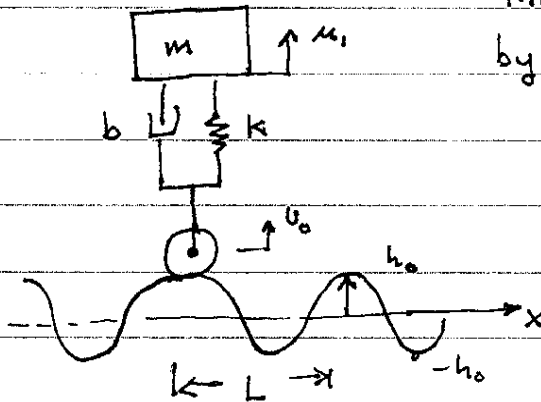


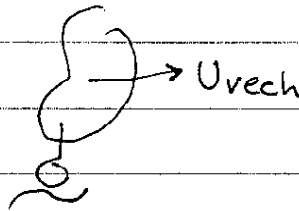
16.413

1° Consider the motion of a single tire-suspension system rolling over a rough road.

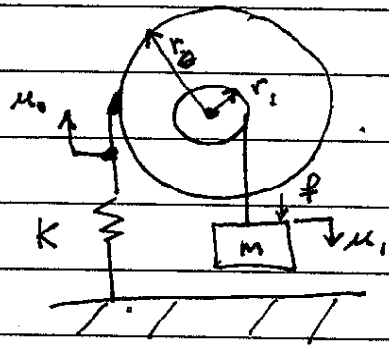
The road surface is given by $y = h(x) = h_0 \cos\left(\frac{2\pi}{L}x\right)$



- (a) Determine $U_1(s)/U_0(s)$ using the mobility analogy
- (b) Determine $U_0(t)$ given that the vehicle's translation velocity U_{veh}



2° Consider the system where the mass M and the spring K are connected via pulley. The inner



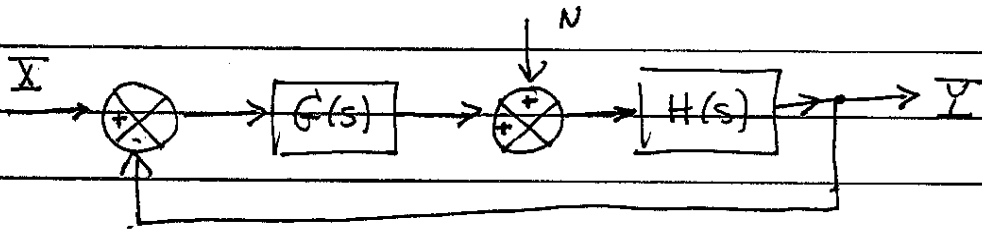
radius of the pulley is r_1 and outer radius is equal to r_0 . The system is excited by a force $f(t)$ applied to the mass.

(a) Draw the electromechanical circuit.

(b) Determine $U_1(s)$

(c) Determine the frequency for which $U_1(s)$ is maximum

3. Consider the system



(a) Determine

$$\bar{Y}(s) = \left[\frac{\bar{Y}}{\bar{X}} \right]_{N=0} \bar{X} + \left[\frac{\bar{Y}}{N} \right]_{\bar{X}=0} N$$