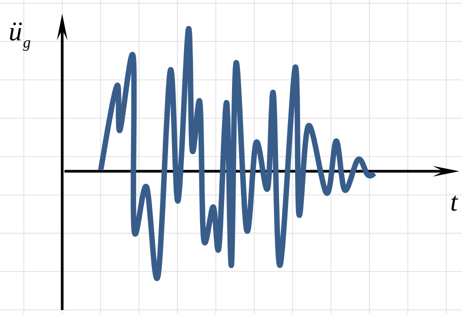
Homework 10

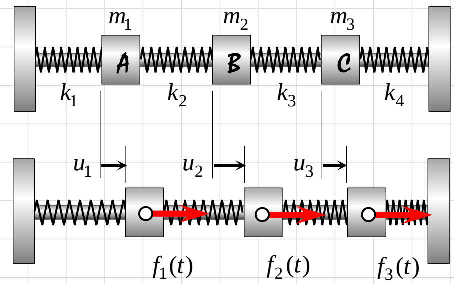
The multi-degree of freedom system shown at right is made of masses and linear springs. The equations of motion for a system subjected to prescribed accelerations at the support point (an earthquake) have the form

$$\mathbf{M}\ddot{\mathbf{u}}(t)+\mathbf{C}\dot{\mathbf{u}}(t)+\mathbf{K}\mathbf{u}(t)=-\ddot{u}_g\mathbf{M1}$$
$$\mathbf{u}(0)=\mathbf{u}_o$$
$$\dot{\mathbf{u}}(0)=\mathbf{v}_o$$

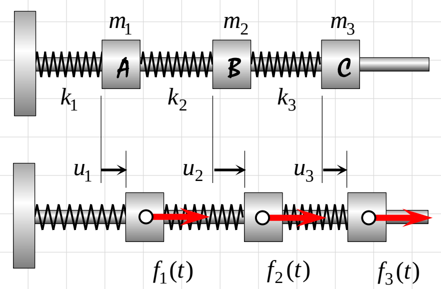
where **M** is the mass matrix, **C** is the damping matrix, **K** is the stiffness matrix, $\ddot{u}_g$ is the support acceleration, **1** is a column matrix of ones, $\mathbf{u}_o$ is the initial displacement vector and $\mathbf{v}_o$ is the initial velocity vector. Implement the earthquake excitation in your MATLAB code from HW8 and HW9. Use an artificially generated earthquake or a measured one (if you can find one on the internet).



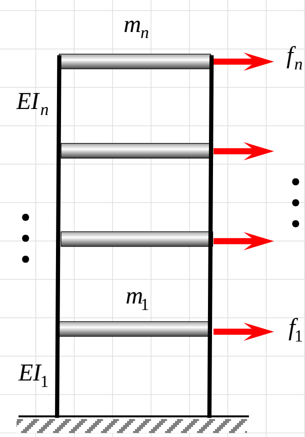
At this point your code should be able to do elasto-plastic response of the individual elements. Make sure that your earthquake is adjusted so that the ground velocity is zero when the earthquake ends.



System 1: "Bridge"



System 2: "Building"



System 3: "Shear Building"