

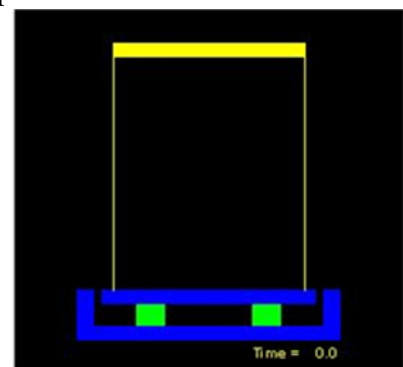
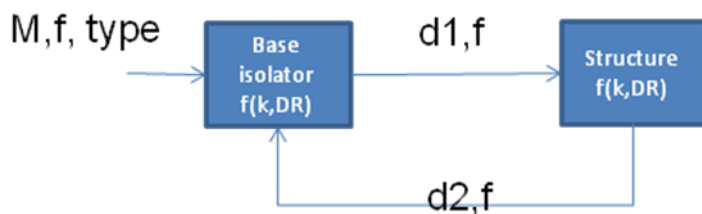
Learning Objectives for a Single Story Analysis Module 1

Students should be able to

- ▶ Explain criteria for evaluating the performance of a designed device or process for minimizing effects of seismic activity
- ▶ Evaluate the **performance** of various base isolators with different damping (versus rollers) using Virtual Laboratory
- ▶ Explain the effects of mass and natural frequency of structures relative to system response. (based on an energy conversion model?)
- ▶ Perform a computational analysis of the forces applied to structures
- ▶ Compare different methods used to reduce the effects of earthquakes on structures. (learning to control the response of a structure to seismic excitation)
- ▶ Begin to explain modeling methods

Model of System

- ▶ The major variables governing the behavior of the system (structure) and base isolators include
 - Structure –
 - Stiffness of frame ($f(I, E)$)
 - Damping ratio of structure ($f(E)$)
 - Mass of floors and walls
 - Natural frequency is a dependent variable
 - Parameters to evaluate for criteria of successful design
 - Amount of displacement
 - Amount of force applied to structure – acceleration
 - Frequency of oscillation of the structure
 - Amount of sheer in the walls –
 - Magnitude of compression and tension –
 - Can the walls sustain the applied forces?



$$\omega = \frac{2.516}{L^2} \sqrt{\frac{EI}{m}} \quad I = \frac{bh^3}{12} \quad \text{Equations for beam}$$