

## Class 05

### Highlights by Peter Lindquist

We discussed the energy required to deform materials and noted that viscous materials will dissipate energy for any amount of strain, while energy put into purely elastic materials is recoverable. Energy will also be dissipated in a harmonically loaded material in which the strain response is out of phase with the loading stress. In a standard linear solid, this occurs at intermediate frequencies that correspond to the timescales at which the delayed elasticity caused by the viscous (dashpot) element will force the strain to be out of phase with the stress, while at high and low frequencies, there is less phase lag due to the dominance of the material's elastic response. In practice, this result is observed in the significant reduction in amplitude of earthquake waves with frequencies on the order of 10 Hz.