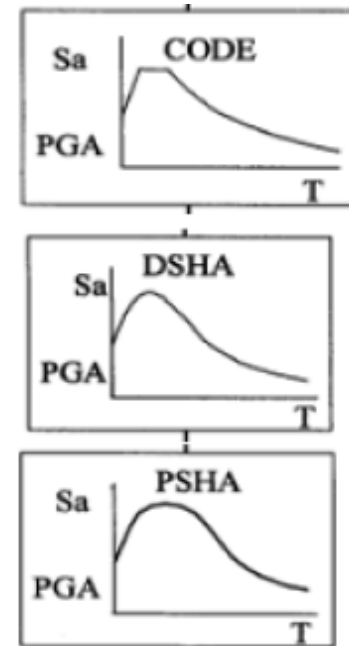
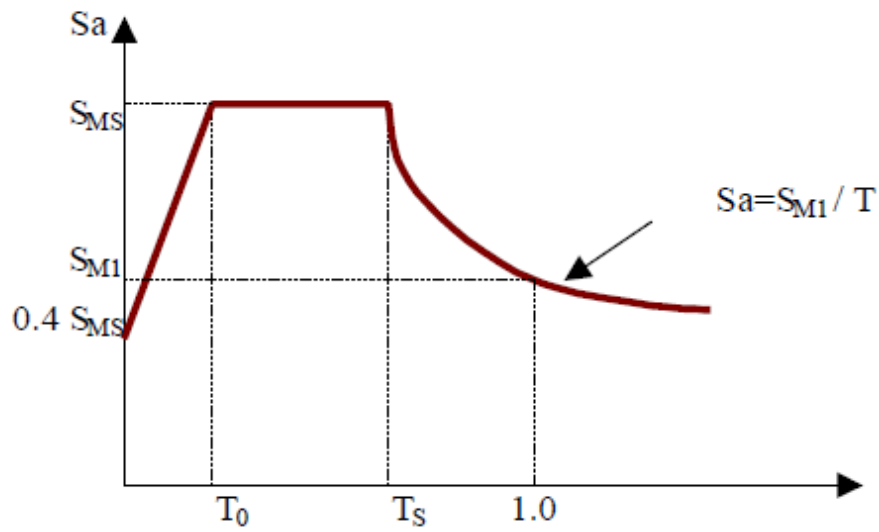


Scaling of Ground Motions

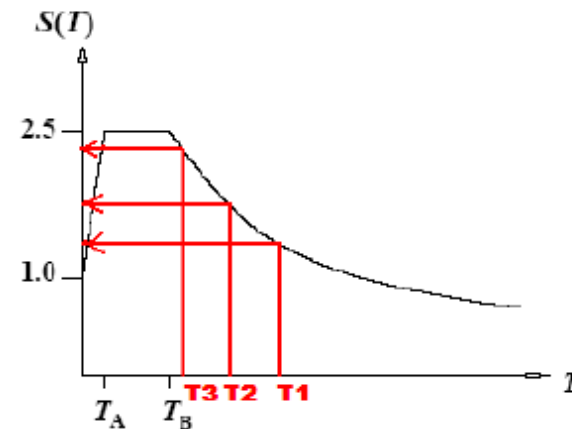
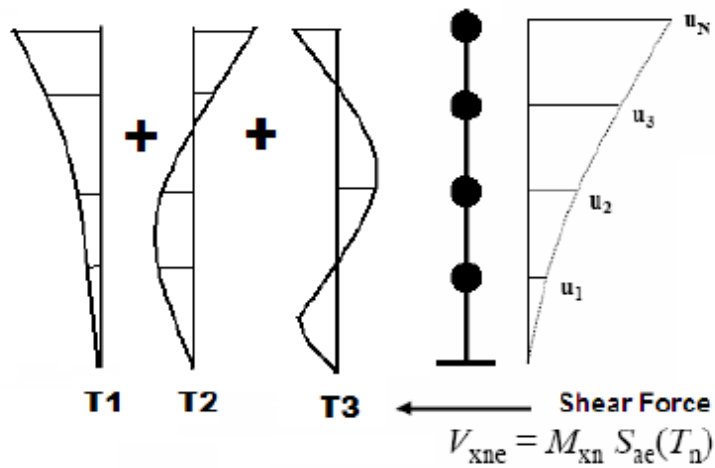
Michael Barnes

EPS 256

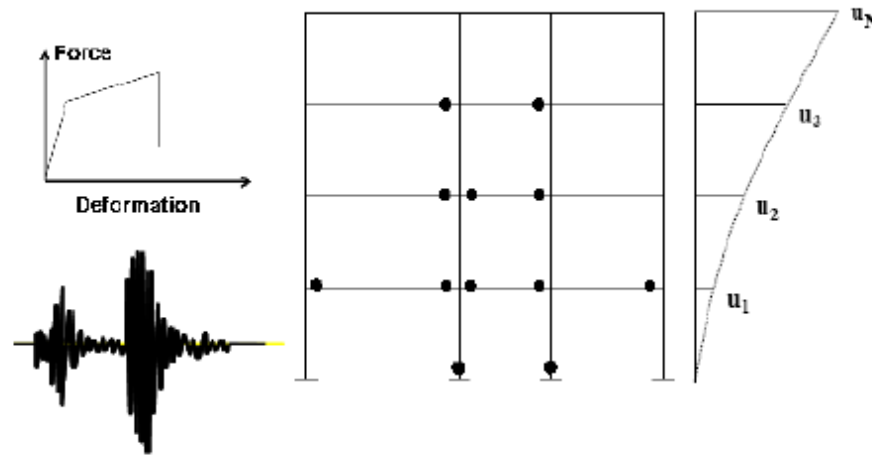
Design Spectrum



Modal Combination Method



Linear and Nonlinear Time History Analysis



Factors that influence Time Histories

- Source
 - Magnitude
 - Rupture Mechanism
 - Directivity
 - Focal Depth
- Path
 - Crustal Structure
- Site
 - Surface Geology
 - Topography
 - Structures

Selecting and Scaling Accelerograms

- Selecting appropriate records is usually based on the design spectrum rather than seismological parameters.
 - However, seismological parameters effect nonlinear response (duration, peak ground velocity, etc.)
- From UBC 1997:
 - Maximum structural response if three records are used.
 - Average structural response if seven records are used.

Real Accelerograms

Advantages:

- Preserves Earthquake Characteristics
 - Amplitude, frequency content, energy content, duration, etc.

Disadvantages:

- Limited sample pool
 - Not all magnitude-distance-soil combinations covered
- Requires a larger (100's) number of records to obtain a stable median

Modified Accelerograms

Advantages:

- Generated to match a target spectrum
- Requires fewer records to obtain a stable median

Disadvantages:

- May not preserve earthquake characteristics
 - Records may have an unrealistically

Fitting Accelerograms to Response Spectrum

