

Educational Priorities of an Old Professor on Seismic Analysis of Structures

By Ed Wilson

Convince Engineers that the Response Spectrum Method Produces very Poor Results

- Method is only exact for single degree of freedom systems
- It produces only positive numbers for Displacements and Member Forces. Results are not in equilibrium.
- Results are maximum probable values and occur at an “Unknown Time”
- Short and Long Duration earthquakes are treated the same using “Design Spectra”
- Demand/Capacity Ratios are always “Over Conservative” for most Members
- The Engineer does not gain insight into the “Dynamic Behavior of the Structure”
- Nonlinear Spectra Analysis is “Smoke and Mirrors” – Forget it

Convince Engineers that it is easy to conduct “Linear Dynamic Response Analysis”

- It is a simple extension of Static Analysis – just add mass and time dependant loads
- Static and Dynamic Equilibrium is satisfied at all points in time if all mode are included
- Errors in the results can be estimated automatically if modes are truncated
- Time-dependent plots and animation is impressive and fun to produce
- Multi support seismic input can easily be considered
- Engineers can gain great insight into the dynamic response of the structure and may help in the redesign of the structural system.

Convince Engineers that using the FNA Method* allows a finite number of nonlinear elements to be added to a linear computer model. Therefore, structural systems such as isolator, gaps and energy dissipation devices can easily be considered.

* See Chapter 18 at the web site edwilson.org

Comments and Question are Welcome at ed-wilson1@juno.com