Revisiting Seismic Demand, Structure Capacity and Design Spectra

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ABSTRACT:
For several decades, seismologists and engineers have been struggling to perfect the shape of design spectra, analyzing recorded signals and speculating on probabilities. This research effort produced several improvements, for example suggesting to adopt more than one period to define a spectral shape, or proposing different spectral shapes as a function of the return period of the design ground motion.

However, the basic assumption of adopting essentially three fundamental criteria, i.e.: constant acceleration at low periods, constant displacement at long periods, constant velocity in an intermediate period range, has never been really questioned.

In this seminar, the grounds of a constant velocity assumption is discussed and shown to be disputable and not physically based. Spectral shapes based on different logics are shown to be consistent with the experimental evidence of several hundred recorded ground motions and to lead to significant differences in terms of displacement and acceleration demand.

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