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Evaluation of site-dependent constant-damage design spectra for reinforced concrete structures


PP [Phaiboon Panyakapo](#)

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Abstract

An investigation on the validity of the conventional design approach known as constant displacement ductility is carried out. The hysteretic behaviour described by the Modified Takeda model is taken to represent the characteristics of reinforced concrete structural systems. The results presented in the form of seismic damage spectra indicate that the conventional design approach may not be valid because cumulative damage is excessively high. The inelastic design spectra based on the *constant-damage* concept are proposed in terms of simplified expressions. The expressions are derived from constant-damage design spectra computed by non-linear response analysis for SDOF systems subjected to ground motions recorded on rock sites, alluvium deposits, and soft-soil sites. The proposed expressions, which are dependent on the local soil conditions, are functions of target seismic damage, displacement ductility ratio and period of vibration. The seismic damage of structures that have been designed based on this new design approach is also checked by a design-and-evaluation approach. The results are found to be satisfactory. Copyright © 2004 John Wiley & Sons, Ltd.

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