

Generation of the target power spectrum density function for an arbitrary design response spectrum

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ABSTRACT

Artificial or recorded acceleration time histories are used to assess the seismic performance of structures. In general, these acceleration time histories envelope the design response spectrum (DRS) but this spectrum enveloping alone does not ensure power sufficiency. Power deficiency at certain frequency ranges could affect the structures or components sensitive to frequency content and could lead to a significant overprediction of seismic capacity. US. NRC requests to demonstrate the power sufficiency of the used time history by comparing the time history power spectrum density (PSD) to target PSD according to Standard Review Plan (SRP) 3.7.1 procedure (US. NRC, 2014). In case regulatory guide (RG) 1.60 spectra, central and eastern United States (CEUS) or western United States (WUS) by NUREG/CR-6728 (2001) are used as a DRS, it is easy to verify the adequacy of PSD. Except the above DRS, target PSD function for an arbitrary DRS should be developed and compared to the time history PSD. Whenever time histories for arbitrary DRS are generated, generation of target PSD is unnecessarily complicated. In this study, representative target PSD function for APR 14000 certified standard design response spectrum (CSDRS) was generated and there is no need to generate the target PSD repeatedly anymore whenever time histories are generated.

REFERENCES

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