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Structure dependent selection criterion of natural accelerogram sets for non-linear time history analysis

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Non-linear response history analysis (NRHA) represents nowadays the more accurate method for prediction of the seismic response of structures because it incorporates in the analysis model the non-linear material and geometry behavior. In NRHA a key issue is the input modeling. A research aiming to find out a selection criterion for different sets of accelerograms, all of them satisfying the spectrum compatibility criteria imposed by the code, that enable a reliable assessment of the seismic demand is performed. The analysis is based on a preliminary evaluation of correlation among parameters for ground motion intensity measure (IM) and cinematic, energetic and damage parameters describing structure nonlinear responses. To this aim, a modified expression of the effective peak acceleration (EPA) is proposed, defined over the range of structure fundamental period referring to undamaged and damaged model would help this recognition. Subsequently, a method of selecting accelerograms has been proposed, able to take into account the two components of each seismic accelerations capable of providing sets of accelerometers compatible with a predetermined response spectrum and which effects on the analyzed structure are individually consistent with the seismic intensity presented by the spectrum. The selection criterion for accelerogram sets is based on the minimum value of the coefficient of variation (CoV) of the EPA. It reduces the dispersion of the effects of each accelerograms on the structure that has to analyze or designed, that is one of the most relevant drawbacks of the selection criterion available in literature. Validation of the criterion is carried out analyzing the response of the three plane multi-stored moment resisting frames (MRFs) to a set of 60 different accelerograms and analyzing the value of the correlation coefficient between input intensity measure and structure response parameters. The effectiveness of a selection criterion is proved by evaluation of average values and COV of NRHA response parameters of MRFs.

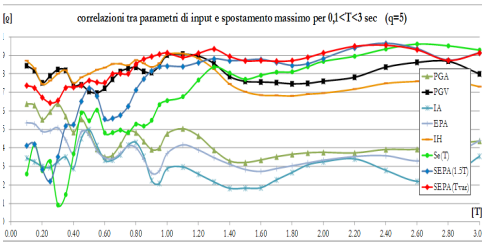

Figure-1: Correlation spectrum among Input Intensity Measure parameters and structure roof displacement for behavior factor value q=3.

References

1. Amiri G G, Dana F M (2004) Introduction of the most suitable parameter for selection of critical earthquake. *Computer and Structures*; 83: 613-626.

2. Baker J, Cornell C A (2006) Spectral shape: epsilon and record selection. *Earthquake Engineering and Structural Dynamics*; 32: 1077-95.

3. Bommer J J, Acevedo A B (2004) The use of real earthquake accelerograms as input to dynamic analysis. *Journal of Earthquake Engineering*; 8(1): 43-91.

4 .Elenas A, Meskouris K (2001) Correlation study between seismic acceleration parameters and damage indices of structures. *Engineering Structures*; 23: 698-704.

5. Evangelos I Katsanos, Anastasios G Sextos, George D Manol (2009) Selection of earthquake ground motion records: A state-of-the-art review from a structural engineering perspective. *Soil Dynamics and Earthquake Engineering*; 30: 157-169.

Biography

Piero Colajanni is an Associate Professor of Structural Engineering at the DICAM, University of Palermo, Italy. He has completed his MSc in Civil Engineering (1990) and PhD in Structural Engineering (1995) at Palermo University. In 1996, he was Visiting Assistant Professor at Florida Atlantic University, Department of Mechanical Engineering, Researcher of Engineering and Solid Mechanics in 1997 and Associate Professor of Structural Engineering in 2001 at University of Messina. In 2013 he moved to University of Palermo, where nowadays teaches building structural analysis and design and seismic design of buildings. Since 1991, he is a Member of Italian National Association of Earthquake Engineering and was Promoter and President of the Scientific Committee of Masters in Seismic Engineering at University of Messina in 2003 and 2006. He has authored more than 150 papers on international and national journals and conference proceedings.

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