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The Analysis of Accelerograms for the Earthquake Resistant Design of Structures

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ABSTRACT

In this paper, the analysis of ground motions (displacements, velocities and accelerations) has been performed focused to the seismic design. The relationships between the peak ground acceleration (PGA), the peak ground velocity (PGV), the peak ground displacement (PGD) and the bracketed duration, with the earthquake magnitude, are presented and their validity and applicability for seismic design is discussed. Finally, the dominant periods of the ground motions (displacement, velocity and acceleration) are obtained from their Fourier Spectrum. Their validity and applicability for the seismic design is discussed also. The results presented in this paper show that the relationships that exist between the important parameters: PGA, PGV, PGD and duration; and the earthquake magnitude, allow the prediction of the values for these parameters, in terms of the magnitude for future strong motions. These predictions can be very useful for seismic design. Particularly, the prediction of the magnitude associated to the critical acceleration, because the earthquakes with magnitude greater than this critical magnitude can produce serious damages in a structure (even its collapsing). The application of the relationships obtained in this paper must be very careful, because these equations are dependent on the source area, location and type of structure. The dominant periods of the ground motions (displacement, velocity and acceleration) that are computed and presented in this paper, are also important parameters for the seismic design, because recent studies have shown that the earthquake shaking is more destructive on structures having a natural period around some of these dominant periods. These parameters must also be handled with caution, because they show dependence with the source area, location and type of structure.

KEYWORDS

Seismic Design, Bracketed Duration, Peak Ground Acceleration (PGA), Peak Ground Velocity (PGV), Peak Ground Displacement (PGD), Dominant Periods

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References

[1] S. K. Duggal, "Earthquake Resistant Design of Structures," Oxford University Press, India, 2009.

[2] H. K. Gupta, "Response Spectrum Method in Seismic Analysis and Design of Structures," CRC Press, Boca Raton, Florida, 1992.

[3] K. E. Bullen and A. B. Bolt, "An Introduction to the Theory of Seismology," Cambridge University Press, Camb- ridge, 1993.

[4] M. O. Erdik and M. N. Toksöz, "Strong Ground Motion Seismology (NATO Science Series C)," Springer, New York, 1987.

[5] K. Adalier and O. Aydingun, "Structural Engineering Aspects of the June 27, 1998 Adana- Ceyhan (Turkey) Earthquake," Engineering Structures, Vol. 23, No. 4, 2001, pp. 343-355.

[6] B. F. Howell, "An Introduction to Seismological Research. History and Development," Cambridge University Press, Cambridge, 1990.

[7] H. Doyle, “Seismology,” Wiley, New York, 1995.

[8] B. A. Bolt, “Seismic Strong Motion Synthetics,” Academic Press, Orlando, 1987.

[9] W. Lee, H. Kanamori, P. Jennings and C. Kisslinger, “International Handbook of Earthquake and Engineering Seismology,” Elsevier, New York, 2003.