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Performance based design of cold formed steel structures

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Thin-walled cold-formed steel (CFS) section construction has gained popularity as light weight construction with high stiffness and easy erection and installation. During earthquake, vibration causes to and fro motion which brings pinching effect in CFS structures. The capacity of CFS structure to dissipate energy in elastic range is less and their dissipation capacities in inelastic range need to be considered. Performance based design is a more general design philosophy in which design criteria are expressed in terms of performance objectives, like lateral deflections, inter-storey drifts, element ductility, and element damage indices, when the structure is subjected to different levels of seismic hazard. The purpose of this paper is to evaluate the performance of cold-formed steel (CFS) structures and based on its performance decide which type of performance is required in a particular hazard level or seismic condition and thereafter design the structure. The goal of a performance-based design procedure is to produce structures that have predictable seismic performance under multiple levels of earthquake intensity. In order to do so, it is important that the behavior of the structures is targeted in advance, both in elastic as well as the inelastic ranges of deformation. It is very essential to understand first, the performance of CFS in seismic conditions and to evaluate the performance, various methods and analyses are required. So, different performance evaluation procedure is discussed. Performance of different CFS structures is evaluated and their suitability in different occupancy conditions is discussed. Finite element modeling is done using ABAQUS to observe the non-linear performance of CFS. Other analysis is done in SAP2000.

Biography

Kamal M Bajoria has completed his PhD from Cambridge University and also Post-doctoral research at Cambridge University Department of Engineering. He is Professor of Civil Engineering at Indian Institute of Technology Bombay, a premier technical university in India. He has published more than 35 papers in reputed journals and more than 35 papers in international conferences and has been serving as Chairman of Indian Association for Structural Rehabilitation.

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