

Matching Standard ۲۸۰۰ and Regulations for Seismic Rehabilitation of Existing Buildings Based on Response Modification Factor

Abstract

Earthquake damages and losses in recent decades have led the attention of researchers and practitioners to improve the seismic parameters in order to obtain more robust structures with less expenditure. In this regard, regulations have been developed in Iran for structures to be designed against strong ground motions. Regulations for Seismic Design of Buildings (۲۸۰۰ Standard) and Instruction for Seismic Rehabilitation of Existing Buildings are the most important ones among the mentioned codes. Experience shows that when a structure is designed based on the ۲۸۰۰ standard, it is not adequate when evaluated using the Instructions for Seismic Rehabilitation of Existing Buildings and needs retrofitting. In this study, by adjusting behavior factor of Standard ۲۸۰۰, steel moment frames will be designed such that they will no longer need any rehabilitation. To achieve this goal, structures with ۲, ۳, ۴, ۵ and ۶ stories are designed in accordance with Standard ۲۸۰۰ and Clause ۱۰ of the National Iranian Building Regulations. Then the same structures are evaluated non-linearly under a set of consistent earthquake records. The results of this study show a poor performance for the original structures. Inelastic behavior in excess of what is permitted at the life safety level of the Instructions is observed. Even in some cases collapse of the structures under certain earthquakes occurs. In order to modify the behavior and improve the seismic safety of structures modified values are suggested for the behavior factor. Reanalyzing the structures designed with the new factors indicates improvement of behavior and seismic adequacy of the modified buildings.

Keywords: Standard ۲۸۰۰, Regulations for Seismic Rehabilitation, behavior factor, non-linear analysis.