

## EFFECT OF STRUCTURAL STEEL PARAMETER AND QUALITY OF CONSTRUCTION UNCERTAINTIES ON SEISMIC PERFORMANC OF A SPACIAL MOMENT RESISTING FRAME

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### ABSTRACT

Seismic excitations are one of the most hazardous loadings encountered during the life time of structures. Seismic evaluation of Steel Moment Frames, which are used often as lateral seismic system subjected to earthquake must account for the structural steel parameter and workmanship uncertainties, is of high importance.

In this study, the uncertainties ,which involve the quality of workmanship (quality of construction and weld fabrication) that is affected in the behavior of the beam-to-column connectionsas well as mechanical properties such as Young modulus and yield-strength, are parameters for considering those associated with structural steel framing parameters. Incremental dynamic analysis is utilized to assess the structural dynamic behavior of the frames and to generate the required data for performance based evaluations.

A probabilistic framework for seismic assessment of a structural system,which takes into account the uncertainty in the mentioned variables, is used to examine the variation of the probability of exceeding a limit state capacity under seismic excitations. In this study, seismic evaluation of structure has been accomplished in two modes, before construction (the designed structure with no uncertainty) and after construction (the structure with uncertainty). This confidence level is assesable and obtaianble through evaluation of the factored demand-to-capacity, namely DCFD format. SMF at the IO performance level, as affected by uncertainties, shows few changs in DCFD values as well as in confidence level in comparisonwith the structure with no uncertaintywhile, at CP, result shows more changes, increase ofthe DCFD parameter and consequently decrease of confidense levelof the structue affected by unertainties.

### INTRODUCTION

An earthquake is a natural phenomenon with destructive influences on human life. Many studies have been carried out on its effects which appear in the form of seismic loads in buildings. In recent years, occurrence of severe earthquakes has caused remarkable developments in the field of earthquake engineering, and in fact these earthquakes have been the landmark on the extensive research conducted by various institutions and researchers, resulting in the formation and formulation of regulations and the instructions on this subject.

One important point regarding earthquake is the uncertainties associated with this phenomenon, and now there are efforts to incorporate their effect in seismic design and assessment of human-made structures.