Seismic Reliability of 2D Steel Moment Frames and Indian Nuclear Power Plant Inner Containment Structure

A thesis submitted to
Indian Institute of Technology, Kharagpur
In partial fulfillment for the award of the degree

of

Master of Technology In Civil Engineering

With specialization in
Structural Engineering

by
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May 2011

Synopsis

This study presents a method for non-linear seismic response prediction and reliability estimation at various performance levels for steel moment frame structures. The time history analysis of steel moment frame is developed considering material and geometric nonlinearity and includes member mesh refinement and strain hardening. Random seismic excitations are generated from a well-accepted power spectral intensity model and modified further to make it non-stationary. Failure criteria have been set from widely accepted guidelines and consequently reliability analysis is done. The study is further extended to Indian nuclear power plant inner containment structure. By performing FE modeling and analysis, critical locations of the structure under accidental pressure and seismic loading conditions have been identified. Reliabilities of the IC shell subjected to random material properties, random static loading and random ground excitation are estimated on the basis of strain-based failure criteria.