**17th Symposium on Earthquake Engineering**
**November 14-17, 2022**
**IIT Roorkee, India**
**Paper No. 414**

# Nonlinear Static and Dynamic Behaviour of RC Wall-frames Using Fiber Inelasticity in Structural Elements

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## Abstract

Wall-Frames, the recommended structural system for lifeline buildings is expected to have satisfactory and desirable seismic performance, especially if located in high seismic regions. In this work, fiber modeling approach is used to model inelasticity in walls and moment frames in a 6 storey-3-bay 2D wall-frame system. Displacement-controlled nonlinear static pushover analyses results from commercial software PERFORM3D suggest, the fiber type inelasticity in numerical models help predict nonlinear static behavior of study wall-frames reasonably well, compared to behavior of wall-frames with lumped inelasticity. In particular, increasing wall plan-aspect ratio enhances earthquake resistant virtues of wall-frames, namely stiffness, strength, and ductility. Further, early yielding is observed in stiffer wall-frames and reasonable ductility achieved in all study wall-frames. Alongside, limit states of structural damages are also monitored to grade the damages and in turn the seismic performance of wall-frames. In addition, results obtained from nonlinear static analyses are confirmed by performing nonlinear time history analyses of study wall-frames, towards quantifying the critical earthquake resistant virtues — results and investigations from the study is a precursor towards recommending design measures to ensure post-earthquake functionality of lifeline buildings.

**Keywords:** Fiber modeling, Nonlinear static analysis, Limit states, Structural damages