17th Symposium on Earthquake Engineering
November 14-17, 2022
IIT Roorkee, India
Paper No. 637

Blast Resistance Capacity of Seismically Designed Building Frames

Sunita Tolani, Shiv Dayal Bharti, Mahendra Kumar Shrimali, Tushar Kanti Datta

[1]Assistant Professor, Department of Civil Engineering, Swami Keshvanand Institute of Technology, Management & Gramothan Jaipur
[2]Professor, National Center for Disaster Mitigation and Management, MNIT Jaipur
[3]Professor, National Center for Disaster Mitigation and Management, MNIT Jaipur
[4]Emeritus Professor, Department of Civil Engineering, IIT Delhi

Abstract

A seismically designed building may be subjected to blast loading in its life span due to a sudden terrorist attack or an accidental explosion. As blast loading is associated with inherent uncertainty, most buildings are not designed for blast loading, but they are routinely designed for earthquake demand. By upgrading the seismic design, the blast resistance capacity of a building can also be improved. The paper investigates the blast resistance capacity of a 6 storey reinforced concrete (RC) building frames designed for peak ground acceleration (PGA) levels of 0.6g, 0.4g, and 0.2g. The building frames are subjected to blast loading caused by the explosion of 500kg of TNT(trinitrotoluene) at small to medium standoff distances. Nonlinear time history of analysis (NTHA) of the frames for blast loading is performed in SAP 2000. Responses of the frames are obtained in terms of peak top floor displacement, maximum inter-storey drift, and number of plastic hinges formed. NTHA results of the building frames are compared to evaluate the relative performances of the three different seismically designed buildings under blast loading.

Keywords: Blast load, RC building, Nonlinear analysis