17th Symposium on Earthquake Engineering
November 14-17, 2022
IIT Roorkee, India
Paper No. 369

Seismic Risk Assessment of Nagpur City Using Google Maps

Mann Mehta[1], Anusha Pandey[1], Ratnesh Kumar[2], Rajashree Kotharkar[3]

[1]M. Tech Student, Dept. of Applied Mechanics, VNIT Nagpur
[2]Professor, Dept. of Applied Mechanics, VNIT Nagpur
[3]Professor, Dept. of Architecture & Planning, VNIT Nagpur

Abstract

According to past studies, rapid urbanization of Indian cities lead to densely populated regions which increases exposure & ultimately the risk for seismic hazard. Risk management is very important to reduce the consequences of forthcoming earthquake. So, seismic risk assessment of cities is essential to estimate the expected life loss, injuries, property loss and to recommend future course of action to reduce the losses. Basically, the methods of risk assessment require building inventory data and seismic hazard as input. Collection of building inventory data (Exposure) for any city is most challenging task as it requires extensive field surveys. In present study, a methodology of developing building inventory data is proposed using the satellite images, street views and user uploaded images in google map. Using ArcGIS, socioeconomic clustering has been carried out for Nagpur city. Further, the accuracy of the methodology has been verified using ground truthing of randomly selected clusters. Vulnerability for Nagpur building typologies is carried out using SeisVARA spectrum tool. Using HAZUS methodology, the risk of various clusters of Nagpur city has been assessed. 2011 census data has been used to find risk of Nagpur wards. The estimated risk based on analytical vulnerability assessment under MCE (Maximum Considered Earthquake) level hazard has been mapped on Nagpur Municipal Corporation (NMC) map and results are compared with Dehradun city. The proposed methodology can be further implemented using AI-ML tool.

Keywords: Exposure, Seismic hazard, Seismic Risk, ArcGIS, AI-ML tool