17th Symposium on Earthquake Engineering
November 14-17, 2022
IIT Roorkee, India
Paper No. 136

Risk Targeted Seismic Hazard Assessment in Uttarakhand Himalayas

Ravi Shastri[1], Yogendra Singh[1], Josodhir Das[1]

[1]Indian Institute of Technology Roorkee, Roorkee, 247667, IN

Abstract

Earthquake is a natural calamity which has troubled the human civilization since ages. With the passage of time, the knowledge of seismic forces intensified and in the present scenario a lot is known about the earthquake resistant design of structures. The first step of design is the determination of demand. There are several philosophies which help in determining the demand forces on the structures. One of them, is the site specific probabilistic seismic hazard assessment, which is discussed in this study.

The probabilistic seismic hazard assessment (PSHA) for the two Indian states in the Himalayan region is estimated in this study. Three seismic source models are taken into consideration while calculating the hazard. The hazard estimation is done using one areal source models and two smoothed seismicity models.

After the hazard estimation, the collapse risks maps are developed using the standard fragility curves, for the study region. In the next step, the iterative calculation of the hazard values is done, to achieve the targeted value of collapse risk of 1% in 50 years.

From the developed risk targeted hazard values, the risk for the building designed for the current Indian standards is calculated at different locations, assuming the fragility curve to be same for different locations. It is found that the code design building results different seismic risk at different locations. Therefore, another building is designed using the risk targeted hazard at the chosen site. Fragility analysis of the building is carried out to obtain the risk of collapse in its life-time. A discussion on the obtained results is also presented in this study.

Keywords: PSHA, Fragility, Collapse risk, Risk targeted hazard