

ABSTRACT

In mountainous terrain, tunnels play an important role in meeting increasing infrastructure demand of the region. Initially it has been assumed that tunnels, being surrounded by stable ground, are less vulnerable during seismic events but during recent earthquakes tunnels sustained severe damages. Therefore, the stability of tunnels during seismic events is a matter of great concern as any kind of failure may lead to interruption of traffic and adverse impact on regional economy.

Tunnels are generally constructed in stratified rock mass. Stratification leads to increase in vulnerability of tunnels in earthquakes due to transition zone between hard and soft rocks causing stiffness and seismic impedance mismatch. This causes differential kinetic movement and additional forces in tunnel liner leading to its failure. Therefore, in present study effect of stratigraphy is assessed by analyzing numerical model of tunnel located in single layer system and two layer geological set up.

As the seismic events are uncertain the assessment of the seismic risk in planning phase by examining vulnerability of tunnel through fragility curves or vulnerability curves is required. Fragility curves can be considered an emerging tool for analyzing performance of structures in earthquakes. Hence, this thesis aims to evaluate seismic fragility curves using numerical approach for tunnel support system which can be used for assessment of seismic risk and development of strategies for risk reduction.