**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI**
**SHORT ABSTRACT OF THESIS**


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Thesis Title: SEISMIC PERFORMANCE EVALUATION OF PROTOTYPE UN-BONDED FIBRE REINFORCED ELASTOMERIC ISOLATORS


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## SHORT ABSTRACT


Testing of prototype carbon fibre reinforced specimens with two different dimensions in plan and different values of shear moduli are carried out under the simultaneous action of design vertical load and cyclic horizontal displacement. Results obtained from experiment show that effective horizontal stiffness of prototype U-FREI decreases with increasing horizontal displacement. Further, since the angle of incidence of earthquake to a structure may be from any directions, experimental evaluation for the effect of different loading directions ($0^o$, $15^o$, $30^o$ and $45^o$) on horizontal response of prototype square U-FREI is also carried out. Analysis of FREIs using numerical technique like FE method is carried out using ANSYS (v.14.0). The force-displacement hysteresis loops and deformed shapes of U-FREIs obtained from the FE analysis are compared with those obtained from experimental investigations to validate the FE model of U-FREIs. The present study proposes an analytical method for the evaluation of secant horizontal stiffness of both bonded and un-bonded FREIs. The method incorporating the effect of both nonlinearity of shear modulus and effective shear area is proposed as a basic analysis tool for predicting the secant horizontal stiffness of U-FREIs. Stability of elastomeric isolators is an important requirement for acceptable design of seismic isolation system. The stability of U-FREI is investigated adopting an existing strategy wherein the isolators are subjected to various vertical loads and varying amplitudes of cyclic horizontal displacement to determine the critical load carrying capacity. U-FREI is an improved system for seismic mitigation of low-rise buildings. In the present study, seismic vulnerability of a two-storey stone masonry building supported on in-house designed U-FREIs is evaluated by analytical fragility curves. Development of step-by-step design procedure of U-FREIs for seismic isolation systems is thus introduced following the design provisions of ASCE/SEI 7-10.