



## PERFORMANCE OF REINFORCED CONCRETE FRAME RETROFITTED WITH BUCKLING RESTRAINED BRACES

**MA Ansary, Professor and Director, BNUS, BUET, Bangladesh**

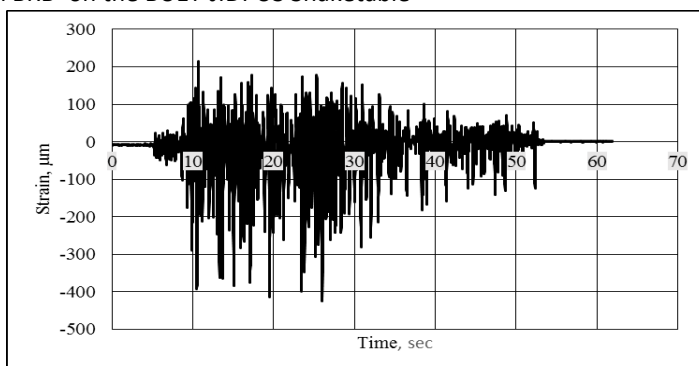
In Bangladesh, BNBC (1993) is being used for the design of reinforced concrete structure. Many advances in earthquake engineering research have taken place over the last few decades. There is a considerable concern regarding the reinforced concrete buildings around the world, which have been built prior the enactment of modern building codes in seismically active region. To alleviate such problem, some ductile materials having sufficient lateral strength and stiffness need to be incorporated into the structures. Performance of conventional bracing system has been found to be poor and recent research findings suggest that those bracing system may not be a reliable solution. In this study, Buckling Restrained Braces (BRB) initially developed by Watanabe and further examined in the United States through testing has been used to reduce the earthquake effect on reinforced concrete frames. The reduction in RC member sizes and increased lateral stiffness and energy dissipation, reducing the drift of the structure during a severe earthquake are the benefits of using BRBs in RC moment frame. From the current tests as shown in photos below, it is clear that reinforced concrete frame without BRB can sustain 0.20g acceleration whereas RC frame with BRB can sustain 0.35g acceleration. RC frame retrofitted with BRB can sustain a lateral displacement of 47mm corresponding to the 0.35g lateral load. Therefore it is clear that frame with BRB perform better and this bracing system is effective at reducing the effect of an earthquake.



RC frame without and with BRB on the BUET-JIDPUS Shaketable



RC frame with BRB with superimposed dead load



Generated strain in bottom reinforcement of column (with BRB) due to an earthquake load