INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	**Ph.D.**

Thesis Title: **Seismic performance evaluation of RBS-CFT connections with bidirectional bolts under cyclic loads.**

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Thesis Submitted to the Department/ Center	:	**20-June-2022**
Date of completion of Thesis Viva-Voce Exam		**18-Oct-2022**
Key words for description of Thesis Work	:	**Bidirectional bolts, CFT, RBS, Semi-rigid Connection, Special MRFs**

SHORT ABSTRACT

This thesis presents experimental investigation on evaluation of performance of a new type of steel reduced beam section (RBS), designated as *V*-cut, and on its role in improving overall safety of RBS-CFT connections subjected to cyclic load. Detailed design steps adopted for design of the *V*-cut RBS with lower depth of cut, as compared to that in the conventional radius cut RBS, are reported in this paper. Behavior of four types of steel RBS and concrete filled tube (CFT) connections with bidirectional bolts were examined. An experimental study was performed to compare the performance of *V*-cut RBS with that of the other conventional radius cut RBS under cyclic loading. It exhibited improved hysteretic behavior, and the new RBS-CFT connection is found to be semi-rigid in nature. Test results show that the energy dissipation in the composite steel connections with *V*-cut RBS is higher than that with radius cut RBS. The application of *V*-cut steel flange beam effectively enhanced ductility and reduced the residual torsional deformation. It reached a rotational capacity of 0.04 radians without any damage in the joint panel region, and thereby meets the seismic provisions of the AISC as a special composite moment-resisting frame. Detailed and simplified nonlinear finite element analysis of RBS-CFT connections with bidirectional bolts was performed using the general-purpose software ABAQUS and OpenSees respectively. The failure patterns of the connections were obtained by the ABAQUS software. Simplified model was proposed in OpenSees to regenerate the hysteresis loops as obtained from the experimental study. Finally, seismic vulnerability assessment has been done by developing experimental fragility curves.