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

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## SHORT ABSTRACT

Seismic assessment of reinforced concrete (RC) structures requires reliable numerical models to predict structural behavior accurately. The existing experimental studies have identified the deformation in an RC member, mainly, consisting of bending (flexure), shearing and bond slip of anchored bar in the footing. This thesis develops fibre-based frame elements to account these deformations. First, a comprehensive force-based fibre beam element is developed, which includes full axial-flexure-shear interaction at both the element and section levels. This element uses a multiaxial constitutive model for concrete based on the Modified Compression Field Theory, along with Mander's confining model. To reduce the computational demand, a simplified version of the force-based fibre beam element is developed, which uses semi-uncoupled section model with a variable shear force-shear strain relationship at the section level. Additionally, a fibre hinge element is developed to model anchorage-slip, incorporating stress-displacement relationships. This element is added in series with the fibre beam element at member-footing interfaces to effectively capture anchorage-slip deformations. Validation through simulations of RC columns in shake-table experiments demonstrates the superior performance of the developed elements in capturing seismic responses compared to traditional fibre element.