



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Dynamic Analysis and Control of String-Stiffened Flexible Robotic Manipulators

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SHORT ABSTRACT

In the present thesis, kinematic and dynamic analyses of a manipulator with a rigid link and flexible joint, a manipulator with flexible links, and manipulators with both link and joint flexibilities have been studied. Kinematic and dynamic modeling of flexible manipulators with the finite element method and assumed mode method both have been done.

In this research work, five problems related to flexible manipulators have been investigated. In the first work, parametric studies of a two-link flexible manipulator both the links of which are flexible, are studied. In the second problem dynamic analysis of a single-link flexible manipulator has been carried out using the finite element method. In the third and fourth problems, the tip deflections of a single-link and a rigid-flexible double-link flexible manipulator have been decreased with the help of a pair of strings tied on both sides of the flexible link. In the fifth and the last problem, kinematic and dynamic analyses of two three-dimensional robotic manipulators of 3 joint axes each employed in cooperative handling of a job are carried out. Synchronization of motions of these manipulators with respect to time of motion and position of their end-effector (tip) has been carried out.