# Multi-Flexible-Body Dynamics Capturing Motion-Induced Stiffness

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## Abstract

This paper presents a multi-flexible-body dynamics formulation incorporating a recently developed theory for capturing motion induced stiffness for an arbitrary structure undergoing large rotation and translation accompanied by small vibrations. In essence, the method consists of correcting prematurely linearized dynamical equations for an arbitrary flexible body with generalized active forces due to geometric stiffness corresponding to a system of twelve inertia forces and nine inertia couples distributed over the body. Equations of motion are derived by means of Kane's method. A useful feature of the formulation is its treatment of prescribed motions and interaction forces. Results of simulations of motions of three flexible spacecraft, involving stiffening during spinup motion, dynamic buckling, and a repositioning maneuver, demonstrate the validity and generality of the theory.

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