Dynamic Response Calculation Of Spatial Elastic Multibody Systems With High-Frequency Excitation

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Summary

The objective of this paper is to establish a computational scheme for dynamic response calculations of a three-dimensional multibody mechanical system with impulsive forces, which give rise to high-frequency excitations. The finite-element method is employed to represent the local deformations of three-dimensional beam-like elastic components by either a finite set of nodal coordinates or a truncated set of modal coordinates. A reduced-order model is obtained by invoking a modal transformation. Both planar and complex modal reduction schemes are established. The developed formulation is implemented into a multibody simulation program that assembles the equations of motion and proceeds with its solution. The computational scheme permits a change in the basis of the modal space in order to regulate the admittance of higher frequencies and to accommodate any change in the kinematic configuration. Numerical examples are presented to demonstrate the applicability of the developed computational scheme.

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