8th. World Congress on Computational Mechanics (WCCM8)
5th. European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)
June 30 – July 5, 2008
Venice, Italy

METHOD OF THE TRANSLATION OF FEM MODELS FROM THE INERTIAL TO THE FLOATING FRAME FORMULATION

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Key Words: *Flexible multibody dynamics, floating frame approach, solid elements.*

ABSTRACT

The floating frame FEM approach offers a very efficient method for the simulation of flexible multibody systems undergoing small elastic deformations and slow rotational speed[1, 2]. However, the majority of models of flexible bodies is developed using the inertial frame formulation in standard structural analysis software (e.g. ANSYS).

This paper presents an algorithm of the translation of models, described using the inertial frame approach, to the floating frame formulation. Here we consider the translation of models, defined using solid elements, whereby the nodes of elements do not have rotational degrees of freedom. That allows us to translate models defined using standard solid elements of ANSYS software [ANSYS].

Here we show how to generate the equations, describing the motion of flexible bodies in floating frame formalism, from the initial values of the node positions and of the mass and stiffness matrices of models described using the inertial frame formalism. No additional information about the types of elements, used during the modelling of bodies, is needed for the equations' generation.

We implemented our method and developed in Maple software a simulation tool, which analyses the parameters of ANSYS FEM models and generates correspondent equations of motion in the floating frame formalism. Integrating these equations, the dynamics of systems can be calculated.

In this article we show the implementation of the software for the translation and the simulation of several ANSYS models.

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