

Rigid Finite Element Method In Analysis Of Dynamics Of Offshore Structures

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This book describes new methods developed for modelling dynamics of machines commonly used in the offshore industry. These methods are based both on the rigid finite element method, used for the description of link deformations, and on homogeneous transformations and joint coordinates, which is applied to the modelling of multibody system dynamics. In this monograph, the bases of the rigid finite element method and homogeneous transformations are introduced. Selected models for modelling dynamics of offshore devices are then verified both by using commercial software, based on the finite element method, as well as by using additional methods. Examples of mathematical models of offshore machines, such as a gantry crane for Blowout-Preventer (BOP) valve block transportation, a pedestal crane with shock absorber, and pipe laying machinery are presented. Selected problems of control in offshore machinery as well as dynamic optimization in device control are also discussed. Additionally, numerical simulations of pipe-laying operations taking active reel drive into account are shown.

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