Motion control systems for high-speed vessels

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The book considers peculiarities of motion control systems (MCS) operation and special features of high-speed vessels (air-cushion ships, hydrofoils, winged surface effect vehicles) dynamics, based on the results of full-scale trials of high-speed vessels and self-propelled models and mathematical simulation.

The studies on optimizing energy characteristics of MCS executive hydroelectric drives are presented. The substantiation is given for the model of optimization of energy characteristics of MCS executive hydroelectric drives for different types of high-speed vessels.

The results of advanced investigations on the development of control algorithms are given along with the results of MCS full-scale trials. Also presented is the method for correcting MCS algorithmic structures by the results of full-scale trials of vessels or their self-propelled models. This method allows for deriving new results in some algorithmic structures.

The possibility is shown for conformance of the extent of functional and elemental failures of MCS equipment and for finding of optimum, depending on high-speed vessel operation purposes.

Presented is the model of synthesizing MCS for high-speed vessels at early stages of designing.

The possibility of using a failure-free control performance criterion for multicriteria estimation of MCS efficiency is determined.

The method of estimation of level, scope and extent of high-speed vessel motion control automation is considered in the book, and the method of personnel habitability evaluation is also discussed.

The book is intended for technical and engineering employees and researchers dealing with ship motion control problems, as well as for teachers, post-graduates and senior students who specialize in this field.

CONTENTS