

Preface

The subject of the monograph is robust control of “An oscillatory-base manipulator (OBM)” which can be regarded as a model system for a variety of mechanical systems installed on the oscillatory base. Further, this class of systems can be divided into subclasses, one of which mainly includes offshore mechanical systems, e.g., offshore cranes, installed on the oscillatory base being affected by wave-induced disturbances, and a typical example of the other subclass is a space robot system mounted on the flexible base which tends to oscillate due to the intrinsic flexible structure. This monograph will focus on the former subclass, i.e., offshore mechanical systems.

The monograph introduces such control problems, and presents some control methodologies to solve them which the author has developed and demonstrates, with respect to control system design and analysis, particularly on “robustness” and control performances by simulations and hardware experiments. The common feature of such control problems can be stated as “how to achieve successful tracking control in the presence of disturbances due to the base oscillation and further model uncertainties and variations.” Therefore, the model of an oscillatory-base manipulator is a very important control objective because it serves as a tool to solve various control application problems in the marine industries, but also can contribute to the control science community as a benchmark system of disturbance rejection and robust tracking control.

The control methodologies presented in the monograph are based on \mathcal{H}_∞ control and sliding-mode control, both of which are now well-known powerful control schemes to solve robust control problems. The author believes that the control problems considered are interesting and useful examples with respect to applications of those well-known control schemes. Therefore, the author strongly hope that not only control engineers involved in marine systems, but also engineers in the other areas and students in the course of control science get interested in such problems, and control theory scientists will employ the problems to evaluate their own novel control schemes.

Please note that the monograph has been designed to be as self-contained as possible. Additionally, the reader can download some demonstration programs for MATLAB[®] from <http://www2.kaiyodai.ac.jp/~toda/obm/>.

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