

Title: **Output Feedback Passivity-Based Controllers for Dynamically Positioning of Ships**

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Abstract

In this paper, a family of passivity based controllers for dynamic positioning of ships is presented. We exploit the idea of shaping the energy function of the closed loop system to obtain different formulations of the passivity based control law using the IDA-PBC methodology. A salient feature of this study is that the proposed control laws are output feedback controllers and the relative velocity measurement is not required. First, we design and analyze two static controllers which can be seen as a nonlinear version of the conventional PD controllers. In presence of unknown disturbances, these controllers do not provide the desired regulation properties. To remove this discrepancy we propose, also in the context of the IDA-PBC technique, a dynamic extension of the system and obtain two new controllers which have the desired regulation properties. These new control laws can be seen as a nonlinear version of the conventional PID controllers. Simulations are included to validate the theoretical results.

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