

Title: Automatic Heading Control for Dynamic Positioning in Ice

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Abstract

Offshore activities in ice-covered waters are gaining increased attention nowadays. Such operations as crew change, lifting, installation, drilling, etc. may require keeping the vessel on a fixed location during long time periods. The use of dynamic positioning systems appears therefore to be an attractive solution, being much more flexible than mooring operations.

However, the ice environment is significantly different from open water conditions. As known from several full-scale experiments, systems developed for open water purpose do not answer all ice challenges. Nevertheless, recent R&D projects have demonstrated the feasibility of DP in ice. During the DYPIC project, a European collaborative program, large amount of ice model basin tests have been performed at the Hamburg Ship Model Basin. Those tests have not only spotlighted station keeping possibilities under certain challenging conditions, but have also brought out several important aspects of ice forces on the hull.

In this paper, the DYPIC outcomes are used to build an automatic heading control system for a DP vessel in order to improve its station keeping abilities in ice. The system with automatic heading is then compared in a numerical simulation framework to a system with fixed heading. The results show that in selected scenarios the DP system with automatic heading control outperforms clearly the one with fixed heading control. Specifically, the ice loads and the power consumption are reduced considerably.

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