

Wave Feed Forward DP and Analysis of the Effect on Shuttle Tanker Operation

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Abstract

From 2000 through 2003 a Joint Industry Project (DP-JIP) was carried out, developing technology to improve dynamic positioning control by using wave drift force feed forward. It could be demonstrated from model tests and computational analysis that better positioning in harsh sea conditions can be achieved for the same or somewhat less power use.

In the present paper the impact of such an improvement on the actual operation of a shuttle tanker is investigated. The target case is the shuttle tanker operation on the Schiehallion Field, West of the Shetland Islands. The harsh weather and severe wave conditions in the area influence the regularity of the operation, especially in winter.

DP time domain simulations for a shuttle tanker in offloading mode have been carried out to assess the limiting conditions for safe operation. Two cases are considered: with wave feed forward and without (the conventional approach). The latter is compared with the actually used criteria. New criteria that would be applicable for the improved DP system have been assessed.

With these criteria, Monte Carlo type simulations were carried out using the program Safetrans (Ref 1). In this program offshore operations can be simulated as a series of tasks with given criteria and criticality. The Monte Carlo approach uses a Captain's Decision Mimic to decide on basis of weather forecast and actual conditions whether a next task can be started or continued or has to be postponed.

The simulations of offshore operations with DP vessels have shown the suitability of the method to investigate the economic benefit of system modifications, e.g. aimed to extend operational limits and/or to save fuel.

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