

'A new method for route optimization using
deterministic and ensemble weather forecasts'
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The MSc thesis report

- The thesis report was written as a paper and will be submitted to an international journal for engineering in the maritime environment shortly.
- On the following slide the abstract from the a recent draft of the paper can be found.

Abstract

This paper presents a new dynamic programming method for multi-objective route optimization of ships. The method, which is based on an extension of the known Dijkstra's algorithm, uses the concept of Pareto efficiency to handle multi-objective optimization and can be used with both deterministic and ensemble weather forecasts. The method is implemented in Matlab[®] and evaluated for a specific test case for use with both deterministic and ensemble weather forecasts. The advantage of the presented method in combination with deterministic weather forecasts is demonstrated in comparison to Dijkstra's algorithm. The comparison between the methods (non surprisingly) shows that both find the same minimum time route, but only the method suggested in this paper was able to find the true minimum fuel route, with about a 15% saving. Evaluation of the presented method in combination with ensemble weather forecasts show that there is an advantage when the objective of the optimization is to minimize fuel consumption. Both these results indicate that the method has potential and that further development and evaluation is needed.

How has this research contributed to solve a problem that exists in the world or in society?

The thesis work has resulted in a new method for route optimization which can be used to reduce fuel consumption for ocean going vessels by significant amounts, thus reducing both operational costs and the impact on the environment.