5 Conclusion

In this paper, a data analysis framework for offshore operations is introduced. An approach integrated ELM-based SA with ANN is proposed that can be applied for DP sensor data. This approach can be employed to quantify the influence of each thruster of DP vessels. To improve the capability of the DP vessels, the most effective way is to increase the thrust when the most sensitive thruster is identified. In order to verify the feasibility of this approach, a benchmark test is conducted. The benchmark test validated the feasibility of the proposed method used for conducting SA. Another experiment of SA on heading modeling in DP operation was conducted. The result shows that this approach can identify those influential factors that have an effect on the heading of the DP vessel. It is seen that the sensitivity analysis of thruster depends crucially on the environmental disturbances. Thus, the sensitivity analysis is of value in the preliminary design of the thrust system of DP vessels.

The sensitivity analysis of the thruster is highly time-dependent. However, in this study, the surrogate model is ANN which cannot represent the dynamic of the DP vessel completely. Therefore, our future work will focus on investigating how to extend the proposed method to adapt to such external disturbances.

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