

Study of Suezmax Shuttle Tanker Energy Efficiency for Operations at the Brazilian Pre-Salt Region

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Abstract : The need to reduce fossil fuels consumption due to the current scenario of trying to restrain global warming effects and reduce air pollution is dictating a series of transformations in shipping. This study introduces, at first, the changes of the regulatory framework concerning gas emissions control and fuel consumption efficiency on merchant ships. Secondly, the main operational procedures with high potential reduction of fuel consumption are discussed, with focus on existing vessels, using ship speed reduction procedure. This procedure shows the positive impacts on both operating costs reduction and also on energy efficiency increase if correctly applied. Finally, a numerical analysis of the fuel consumption variation with the speed was carried out for a Suezmax class oil tanker, which has been adapted to oil offloading operations for FPSOs in Brazilian offshore oil production systems. In this analysis, the discussions about the variations of vessel energy efficiency from small speed rate reductions and the possible applications of this improvement, taking into account the typical operating profile of the vessel in such a way to have significant economic impacts on the operation. This analysis also evaluated the application of two different numerical methods: one based only on regression equations produced by existing data, semi-empirical method, and another using a CFD simulations for estimating the hull shape parameters that are most relevant for determining fuel consumption, analyzing inaccuracies and impact on the final results.

Keywords : energy efficiency, offloading operations, speed reduction, Suezmax oil tanker

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