

Fuel Consumption and Emission Predictions: Application to a DP-FPSO Concept

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Abstract

From 2000 through 2003, a joint industry project (DP-JIP) was carried out, in which the effects of various dynamic positioning control options were investigated. The impact upon fuel cost and emission is a major factor in the assessment of DP performance. Hence, a method was developed to predict the fuel consumption and emission of a DP-vessel, making combined use of a simulation model for dynamic positioning and a simulation model for energy flows in an operating ship.

In the present paper the method and typical results are presented, comparing a passively moored FPSO and a DP-FPSO concept for the Gulf of Mexico

DP time domain simulations for the DP-FPSO concept in full and ballast loading condition have been carried out to assess the thruster action (delivered thrust) in the range of conditions of a typical Gulf of Mexico climate scatter diagram. The time series of delivered thrust were input to the dynamic simulation of the energy systems, taking into account the thruster characteristics. Fuel consumption and emissions (CO₂, SO₂, NO_x, HC and CO) could be evaluated over a typical year of operation in the Gulf climate. The method accounts for variation of design and operational parameters as well as off-design conditions, such as partial loading of generators.

The application of the simulation technology is found useful and effective for evaluation of environmental effects of operations with DP vessels, and for the investigation of the economic and environmental benefit of system modifications aimed to save fuel and/or to improve energy efficiency.

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