

Title: Station keeping with High-Performance Rudders

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Abstract

Today's offshore vessels and other marine vehicles operating in DP mode are equipped with azimuth drives, propeller-rudders drives with or without nozzles, steerable nozzles and tunnel thrusters to provide sufficient manoeuvring. Even when azimuth thrusters became very popular and seem to be ideal drives to generate multi directional propulsion for DP, classical propulsion still is strongly present on DP supported vessels. Beside the facts that conventional propeller – rudder arrangements provide extraordinary performance regarding bollard pull, response times and cruise behavior, recently new approaches for further improvement of DP operation with rudders were developed.

The choice for one solution or a combination of several ones should be made with knowing the full potential of each alternative and under consideration of compliance with the overall operational requirements. For DP operation with high efficiency rudders the steering gear is often controlled in a rather rough way, where relatively high corrections in rudder angle were applied. This leads often to a generation of relatively high rudder forces, the vessel turns more than for predicted position correction is necessary and followed by a similar counteraction in the opposite direction. Result is a hysteresis in operation, which means unsteady work of main engine, increased energy consumption due to large orbiting around a set position and permanent operation of the rudder controls connected with higher wear on system components and related maintenance costs. This present situation is mainly caused through a lack of information about general and current performance of propulsion by the control system. For efficient assessment of rudder performance it is essential to consider properties of different rudder types and profiles. These will perform regarding generation of lateral forces and drag, start of separation, the maximum possible rudder angle with much difference.

When there is the choice between different propulsion concepts, the rudder specification for DP should contain magnitude of required maximum ahead thrust, lateral force and response time for generating it. It is also recommendable to ensure that the control system is able to consider the special properties of the chosen propulsion system.

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