

Estimation of long-term drag performance of fouling control coatings using an ocean-placed raft with multiple dynamic rotors - DTU Orbit (08/11/2017)

Estimation of long-term drag performance of fouling control coatings using an ocean-placed raft with multiple dynamic rotors

An experimental setup was designed and built to estimate changes in the skin friction of fouling control coatings (FCC) over an extended period of time in conditions simulating the vast majority of ship profiles (regarding speed and activity) in the present market. The setup consisted of two separate parts: one aged FCCs directly in seawater in a dynamic manner by simulating the exposure condition of a ship's hull, and a second, laboratory part measured the torque (drag) of aged coatings in a rotary setup. From the spring to the autumn of 2013 and 2014, four commercial FCCs were exposed for 53 weeks in Roskilde Fjord, Denmark, which is characterized by relatively cold seawater and a salinity of approximately 1.2 wt%. The in situ immersion seawater conditions consisted of five-week cycles divided into 2 weeks of static immersion and 3 weeks of dynamic immersion, during which time the cylinders were rotated at a tangential velocity of 8.1 knots. The skin friction was found to generally increase more during the static period, compared to the dynamic ones. Over the course of the entire exposure period, the skin friction of the investigated FCCs decreased in the following order: fluorinated fouling release coating (FRC) (highest skin friction), hydrogel-based FRC without biocides, silylated acrylate self-polishing copolymer coating, and hydrogel-based FRC with biocides (lowest skin friction). However, the differences in skin friction between the latter three coatings were minor and often within the range of experimental uncertainty. The average surface roughness of the FCCs in the newly applied and mechanically cleaned condition, determined as the $R_t(50)$ and R_z parameters, was evaluated as poor predictors of skin friction.

General information

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