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Investigation of Vapour Film Formation on Nanolayer Surfaces to Reduce Drag on Marine Vessels

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Abstract

Although electric vehicles are becoming a viable solution for urban transport, in the areas of maritime sectors vehicles still do not find alternatives to fossil fuels. Since most studies are argued that the performance, fuel consumption, and energy losses are strongly influenced by the drag force, therefore, it is intended to improve the surface properties of moving bodies against the water, and hence reduce drag. For these reasons, new technological solutions to reduce drag reduction on marine vessels by combining together compliant surfaces can be expected. Towards a ground-breaking solution in the drag reduction for marine vessels, developing a new concept, where two-phase flow generation (boiling crisis [1]) solutions would be used in a complex way together with compliant surfaces. The research was focused on testing activated aluminium in second-degree boiling crisis processes. The Leidenfrost phenomenon [2] was achieved at a water temperature of 60 ^{o}C and a sample temperature of 580 ^{o}C. It has been observed that as soon as the Leidenfrost effect disappears, intense generation of hydrogen bubbles occurs, but not, as previously thought, in the case of the generation of a stable layer of film steam. The results obtained raise new hypotheses for the investigation of the conditions for the generation of hydrogen gas when the tests are carried out in water saturated with sodium hydroxide.