

Computational fluid dynamics (CFD) study on a hybrid airship design

ABSTRACT

The aerodynamic lift and drag performance is one of the important considerations for hybrid airship configuration design. In conjunction with this, simulation study of aerodynamic characteristics can certainly benefit the process of deriving the best possible configuration for hybrid airship design. The aim of this study is to investigate the trend of aerodynamic lift and drag performance for an airship design in different velocities, altitudes and design fineness ratio using the Star CCM+ analysis tool. The airship model applied in this case study is an approximate model of the Atlant-100 airship. It is found that the airship model with low design fineness ratio typically generates much better aerodynamic lifting force in comparison to those with high design fineness ratio. On the other hand, while the range of estimated drag coefficient values is found to be rather insignificantly different, the presence of effects from the design fineness ratio is still evident. Generally, high design fineness ratio for the airship model seems to produce much lower drag force.

Keyword: Hybrid airship; Aerodynamic performance; Atlant-100; Star CCM+; CFD analysis