

Abstract Submitted
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A simplified linear free-surface treatment for RANS calculations

CHRISTOPHER KENT, Florida Institute of Technology — There are many different techniques used to capture free-surface flows in RANS calculations (e.g. level-set, mesh deformation, VOF). These methods all have significant costs attached to them and while they are useful for problems where there is strong nonlinearity or wave breaking are present, these methods can prove overly costly for simple ship drag problems due to the high number of cells that must be located in the vicinity of the free surface. In general ship drag problems the effect of the free surface on the boundary-layer development and the interaction between the two is the major concern, not the wave breaking effects. This can be seen in the success of classical linear predictions for many of these types of problems. The method to be presented approximates the free surface by solving a simple linear pressure based boundary condition at the mean free surface. This approach is straightforward and requires only minimal modifications to existing RANS codes, while significantly decreasing the meshing requirements over other forms of tracking. In initial tests this method has shown reasonable agreement with VOF simulations for the wave maker problem and further validations will be presented.

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