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Prediction of cavitation dynamics in marine applications

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The use of cavitation modeling within the maritime industry area is in a crucial state. The advances in the computer power, the understanding of the numeric?s and cavitation phenomena do make possible to bring these kinds of simulations into the daily use. The general goal within the marine industry is to have a numerical tool which can predict the accurate behavior of cavitating flow both in design stage and for problem solving situations.

In this presentation results will be shown of cavitating flow obtained with STAR-CD, for a two-dimensional case (NACA 0015 profile) and for a three-dimensional case (Twst11 foil). These cases are the most popular numerical and experimental benchmarks used to validate the cavitation simulations. This step will prove the capability of simulations when using the proposed cavitation modeling in conjunction with a RANS solver approach. For an adequate mesh and proper turbulence modeling, it is possible to make accurate predictions for developed cavitating regions like: sheet, clouds and vortices.

In the final step, the cavitation modeling will be put to the test for a real marine application challenge: a model scale and full scale propeller.

The proposed method for implementation of the cavitation model within STAR-CD proves to give consistent results for both, model and full scale.

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