Cavitation modelling using RANS approach

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 of the cavitation phenomena do make possible to bring these kinds of simulations into the daily use. The goal is a cavitation method to be applied from the design stage to the problem solving situations. The paper will present cavitating results obtained for a two dimensional case: NACA 0015 profile and for a three dimensional case: Twist11 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 and RANS solver approach. For an adequate mesh and proper turbulence modeling, predictions for developed cavitation regions like: sheet, clouds or vortices are possible. In a final step, the cavitation modeling will be put to the test for a real application challenge: a propeller. This last complex case will involve a rotating propeller and therefore moving mesh approach has to be implemented as well. By the end of the paper, the proposed cavitation method used within a RANS code for dedicated flow features grids, proves to give consistent results.

Author Name:
A.I.Oprea
N.Bulten
Industries:
Marine [1]
Products:
STAR-CD® [2]
Conference Location:
Warwick, UK
Conference Proceeding PDF:
Cavitation Forum 2011 Wartsila final.pdf[3]
Pages:
10
Publisher:
Warwick IMRC
Conference Name:
WIMRC 3rd International Cavitation Forum 2011
Image:

improved.

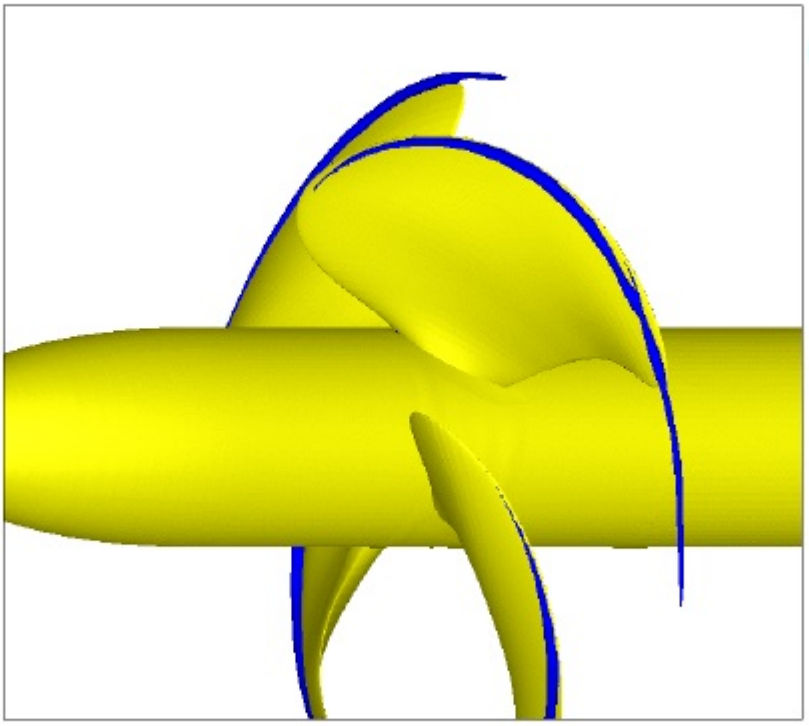

Figure 18: Pressure iso-surface=2370Pa, simulations

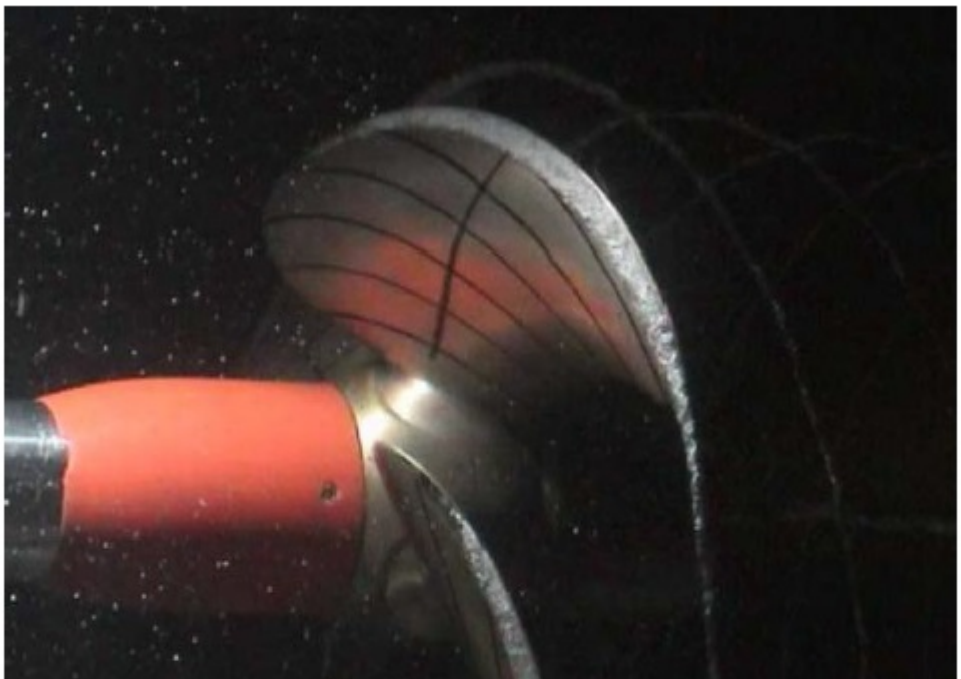

Figure 19: Cavitation visualization, model tests

Note that, the cavitating results over the skew propeller are still under investigation and further post-processing is to be done and published in a later stage, both on model and full scale.

CONCLUSIONS

still to be

REFERE

1. STAR-
2006
2. Reboud
flow stru
unsteady
1998
3. Arndt
'Instabilit
approach'
4. Abbot
5. Bulten
torque pre
RINA, 20
6. Koop
Dimensio
Twente,
7. Foeth
Cavitation
Netherlan
8. Foeth
a three-d
Netherlan
9. VIRTU
Commissi
10. Foeth
Hydrofoil
11. LEAD
the high
communi
12. Carlto
13. Bank
Turbulent
Proceedin