

# Using SC/Tetra to Estimate Ship Hull Pressure Fluctuation

## Case study for cavitation flow analysis

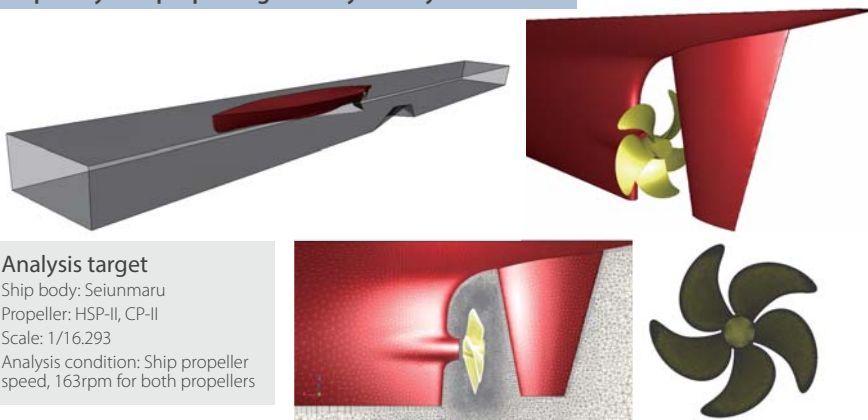
SC/Tetra is used to simulate transient cavitation around a ship propeller and estimate the resultant ship hull pressure fluctuation

### Estimating Ship Hull Pressure Fluctuation

Transient cavitation around a ship propeller is caused by non-uniform flow in the wake of the ship body. Because this results in increased ship vibration, noise, and erosion, predicting cavitation during the ship design phase is essential.

Referencing cavitation flow test conditions for a ship model<sup>[1]</sup>, SC/Tetra was used to evaluate propeller transient cavitation and verify the accuracy of computationally estimating the resultant ship hull pressure fluctuation<sup>[2]</sup>.

### Ship body and propeller geometry – analysis overview

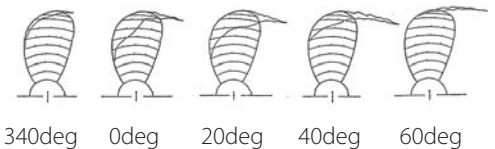


#### Analysis target

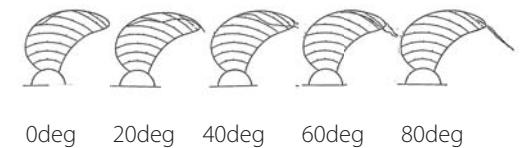
Ship body: Seiunmaru  
 Propeller: HSP-II, CP-II  
 Scale: 1/16.293  
 Analysis condition: Ship propeller speed, 163rpm for both propellers

### Comparison of cavitation patterns

#### CP-II 163rpm condition



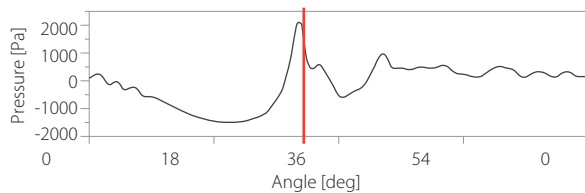
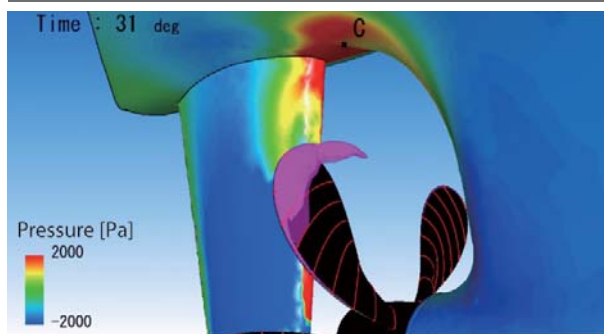
#### HSP-II 163rpm condition



[1]Kurobe, Y., et al., "Measurement of Cavity Volume and Pressure Fluctuation on a Model of the Training Ship" "SEIUNMARU" with Reference to Full Scale Measurement (in Japanese)", SRI Report, 1983

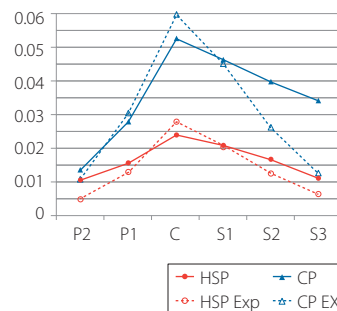
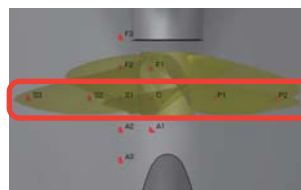
[2]Fujiyama, K., "Investigation of Ship Hull Pressure Fluctuation induced by Cavitation on Propeller using Computational Fluid Dynamics", Proc. of the 17th Cavitation Symposium, 2014

### Analysis of pressure fluctuation

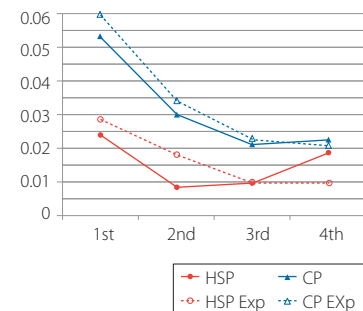
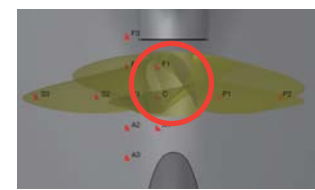


### Comparison of pressure amplitude fluctuation between analysis and experiment

#### Primary blade passing frequency component



#### Amplitude of pressure fluctuation\*



### Notes

SC/Tetra was used to predict transient cavitation around a ship propeller and the subsequent induced pressure fluctuation on the ship hull with high accuracy. With this confidence, these analyses can be performed during the design phase for new ships to optimize ship body and propeller geometries.