

# COMPUTATIONAL FLUID DYNAMICS SERVICES

Through simulation of complex fluid flows through Computational Fluid Dynamics (CFD) analysis, ABS captures data that helps improve results and reduce costs of naval vessel design and maintenance.

High value assets such as naval surface combatants, auxiliaries, pre-positioning platforms, fast sealift ships and Coast Guard interdiction vessels have rigid operational requirements and strict mission statements.

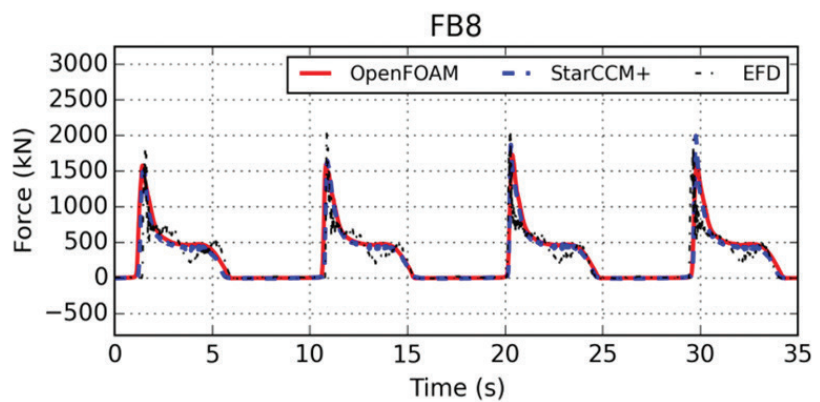
These requirements are typically more severe than those for commercial vessels, and are not always subject to compromise during adverse weather conditions.

Designing and maintaining such vessels requires the highest fidelity, physics-based analysis tools currently available, such as CFD analysis, for aspects of design involving fluid mechanics or fluid-induced structural loads.

## CFD SERVICE OFFERINGS

The ABS CFD team can provide a number of services that aid clients including:

- Design phase performance prediction and optimization of speed, power, sea keeping, maneuvering, etc.
- Prediction and reduction of added resistance and powering in extreme weather
- Design optimization in order to minimize vibration, cavitation and ship motions
- Simulation of air wake for aircraft operations
- Analysis of impact loads such as slamming, sloshing and green water on deck

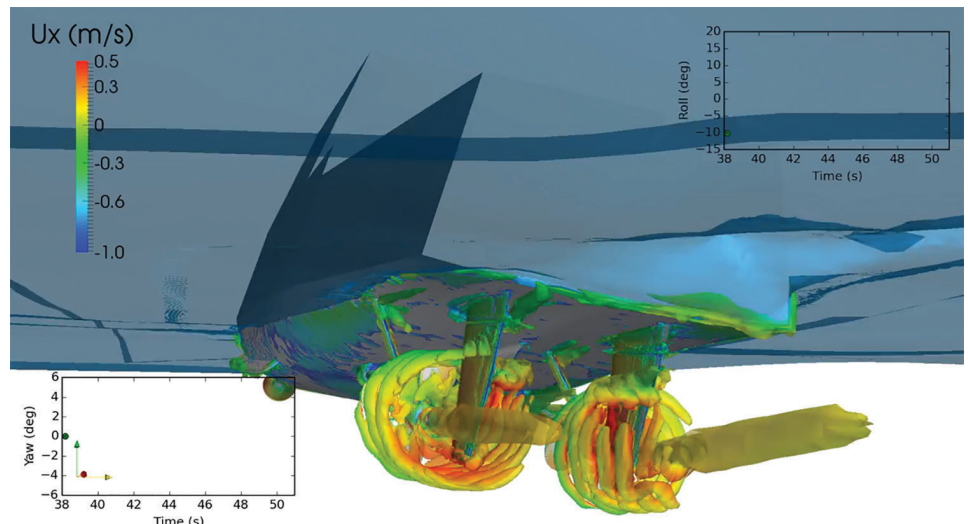


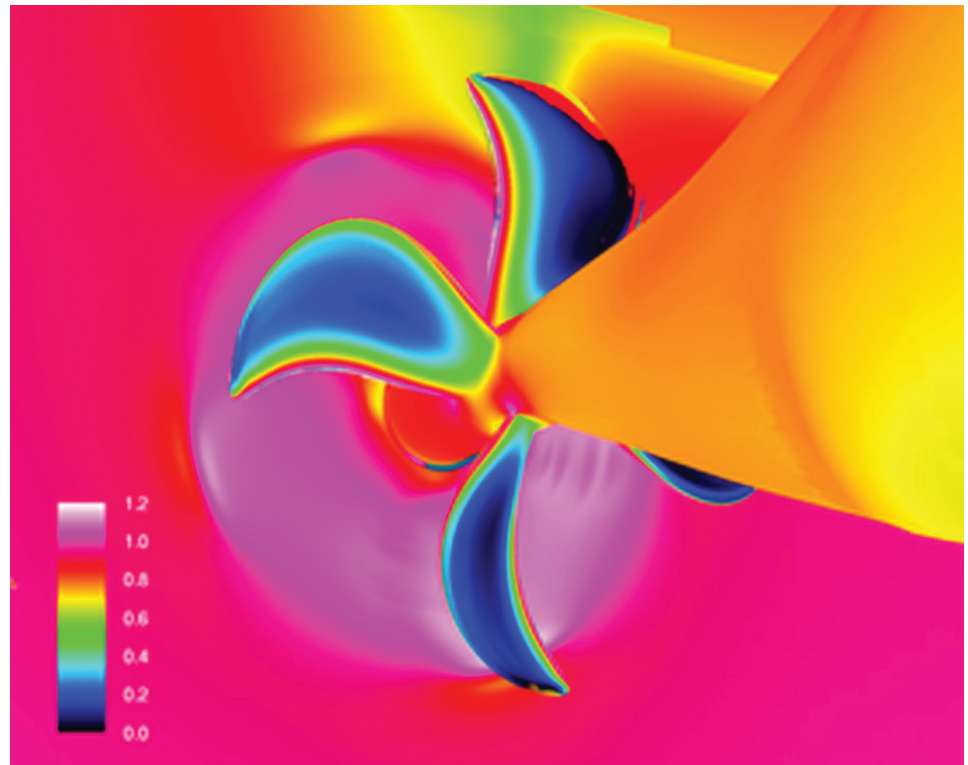
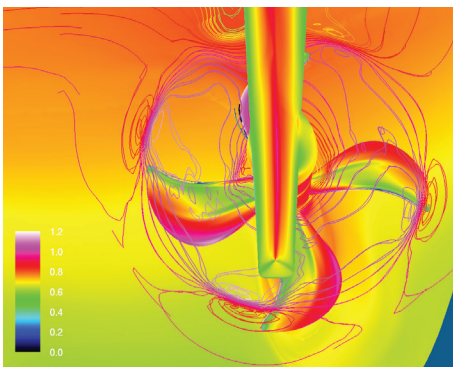
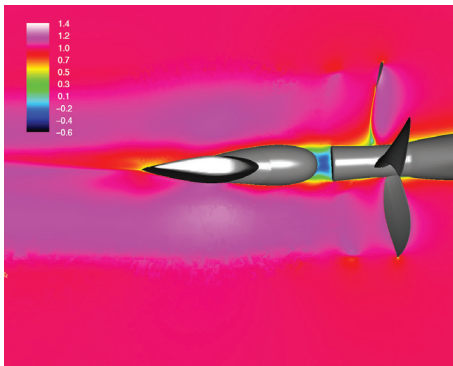
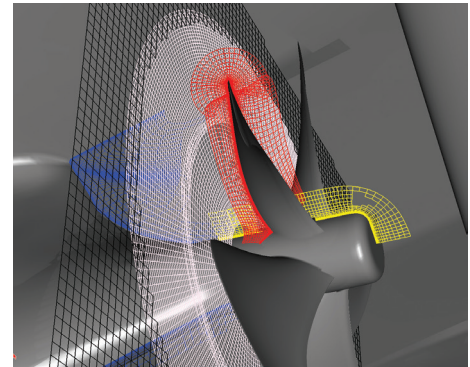
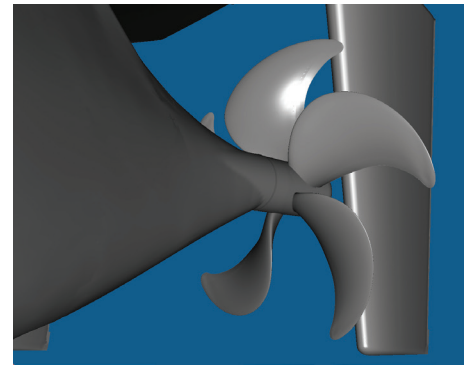
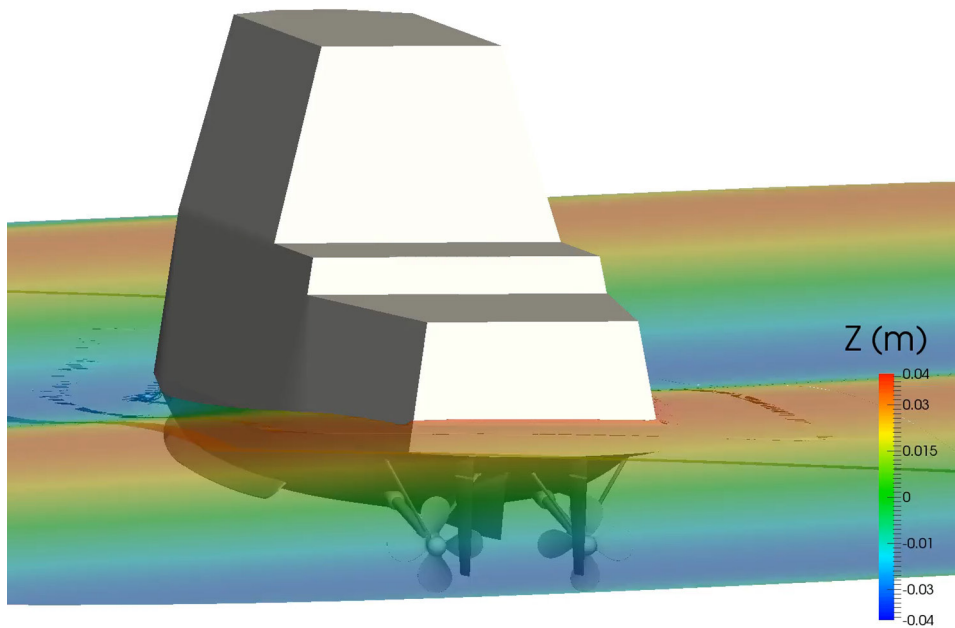
- Optimization of fluid/structures interaction through the entire operating envelope to ensure proper stern tube bearing performance
- Assessment of potential safety concerns like dynamic stability of small, high-speed vessels

allowing measurements to be taken on the bow bottom plating, topsides flare, deck, breakwater and stern bottom plating. Tests included a range of wave heights, lengths and angles; in both regular and random sea states. The below plot compares CFD code outputs to experimental results of impulse pressure loads at the topsides flare. Very good agreement between the outputs and measurements provides confidence in the validity of the CFD results, while demonstrating the value of ABS CFD services.

## CFD CODE VALIDATION

Towing tank measurements were compared to CFD results for the purpose of validating CFD codes. A ship model was instrumented with pressure and force transducers,





For additional information on ABS International Government Services, please contact us at [IntlGovt@eagle.org](mailto:IntlGovt@eagle.org).



**WORLD HEADQUARTERS**

16855 Northchase Drive | Houston, TX 77060 USA

P 1-281-877-5800 | F 1-281-877-5803

[ABS-WorldHQ@eagle.org](mailto:ABS-WorldHQ@eagle.org) | [www.eagle.org](http://www.eagle.org)

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