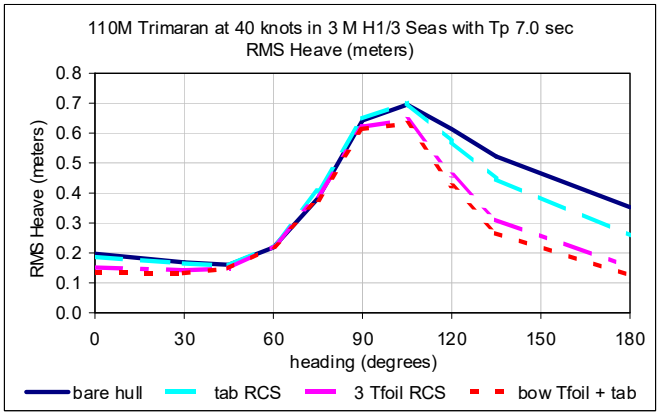
# Ship Motion Simulation & Analysis

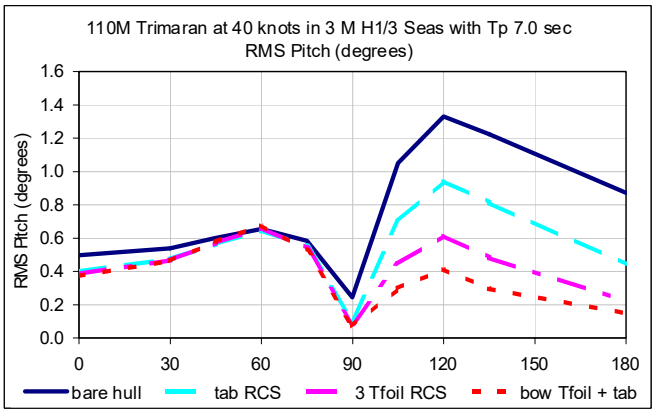
*Prediction and Testing of Vessel Motions & Effectiveness of Ride Control Devices*

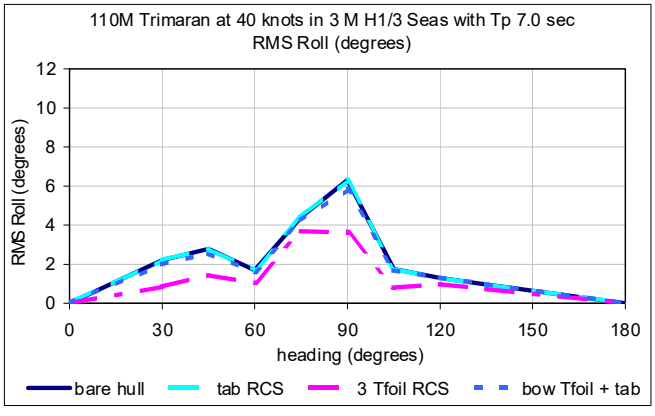
***Naiad Dynamics began conducting frequency and time domain motion simulations over 40 years ago with the US Navy Surface Effect Ship Program. Since then, we have refined and expanded our capabilities to produce seakeeping simulation tools for a variety of hull forms and motion control devices. Our proprietary suite of simulation programs have been validated with tank tests and actual data from installed systems, and is the most effective method of determining the best customized Total Ride Control® solution.***

## Process Overview

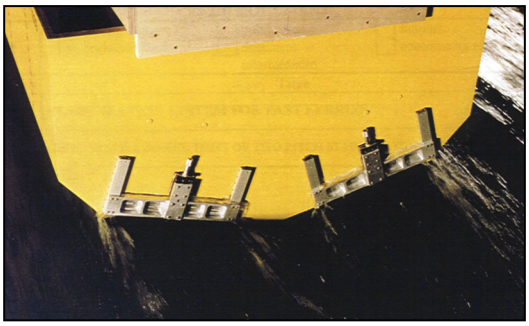
- Roll, pitch, yaw, heave and sway motions are first computer modeled on the bare hull to simulate the uncontrolled motions at a variety of speeds, headings and sea states.
- Sea condition data, even those for a particular route, are specified by custom spectra taken from wave height measurements, or by Pierson-Moskowitz, JONSWAP or ITTC spectra for all headings.
- Simulation results are graphed in RMS values for the five degrees of freedom, as well as vertical and lateral accelerations for detailed analysis. From this data, Motion Sickness Incidence (MSI) and Motion Interruption Incidence (MII) averages are predicted. Suitable control devices are then specified.
- A scale model of the bare hull can be fabricated and tank tested for comparative data to fine-tune the simulation programs.

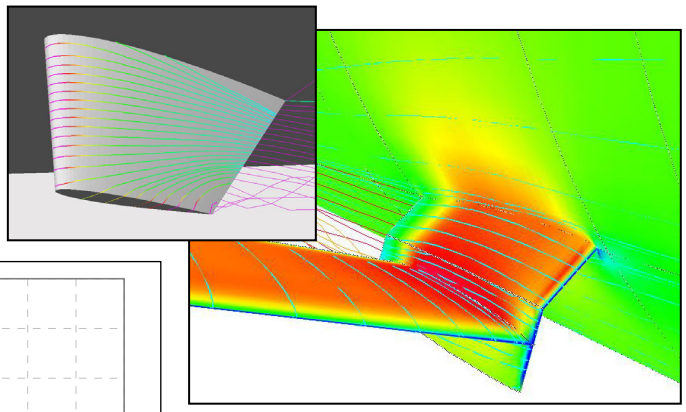



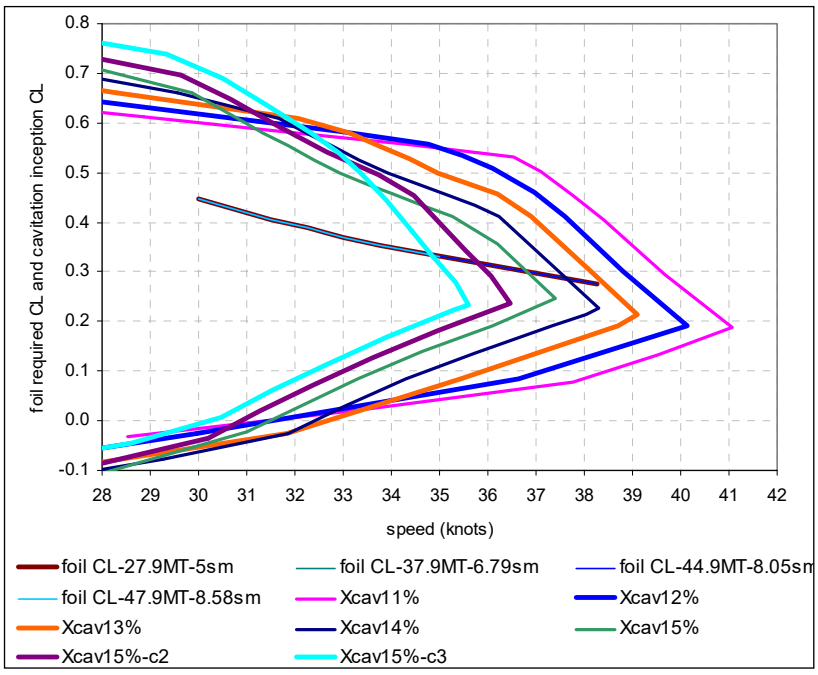
- Active T-Foils, Trim Tabs, Interceptors, Lifting Foils, Fins, Air Cushions and/or Rudders are used in simulations alone and in combinations to identify the most effective motion control solution.
- Scale models can be fitted with recommended control devices and tank tested for RCS performance using actual Naiad control system hardware.
- Computational Fluid Dynamics (CFD) simulations are used to generate 2D and 3D flow studies, control surface resistance and load estimates, and cavitation inception predictions.
- A Ride Control Assessment is prepared, along with recommended control devices, power and control systems and performance expectation. Wakes and surface waves can also be modeled and predicted.



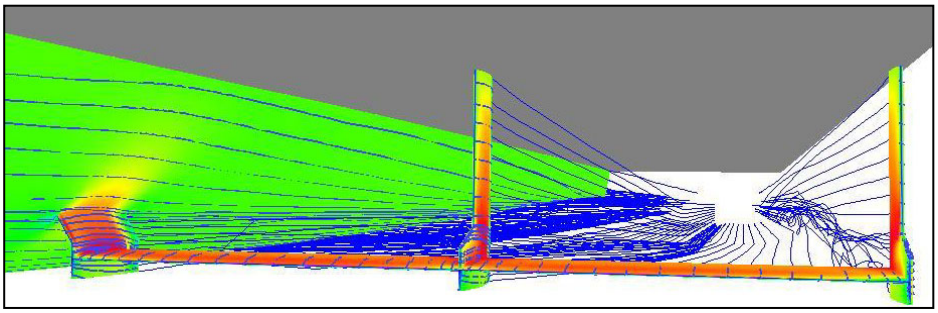
*Scale Model Active Interceptor Tank Testing*



*CFD Analysis*




*Cavitation Inception Estimates*



*Streamlines, Wakes and Surface Wave Predictions*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## NAIAD DYNAMICS: The Science of Ship Motion Control®