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Computational Fluid Dynamics; Ship Hydrodynamics; Turbulent Free Surface Flows; Fluid-Structure Interaction; Propulsion and Renewable Energy Systems; Bubbly Flow; Hydro-acoustics; Parallel Computation

Research Group: Two Ph.D. research students

Funding: Office of Naval Research

Ship Hydrodynamics:

- Modeling of the dynamic instability of ocean vehicles in heavy waves
- Modeling of maneuvering and control of ships
- Control and dynamics of unmanned surface/underwater vehicles
- Modeling of damaged ship and flooding process

Turbulent Free Surfaces:

- Turbulent structures and modeling
- Vortex breaking
- Wave run-up round offshore piles
- Wave breaking
- Blast Waves
- Shallow water and Bragg resonance

Fluid-Structure Interactions:

- Structural stability
- Vortex induced vibrations
- Bio-inspired extremely flexible control surfaces

Propulsion and Renewable Energy Systems:

- Wave and wind turbines
- Energy saving devices for marine propellers (pre and post swirl devices, wake equalizing)
- Water-jet propulsion

Bubbly Flow

- Bubble Dynamics
- Ventilation flow modeling
- Propeller Cavitation
- Skin friction systems (air cavity and micro bubbles)

Hydro-Acoustics:

- Propagation of sound waves in complex environments such as porous media and bubbly flow
- Interaction of sound with ocean internal waves

