YANG CHEN

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RESEARCH INTERESTS

- Numerical Methods:
  Finite-Volume Method, Boundary-Element Method, Interface capturing methods (Level-Set and Volume-of-Fluid), Innovative algorithms for complex engineering problems
- Marine Hydrodynamics:
  Free-surface flow, Wave impact
- Computational Fluid Dynamics:
  Interaction between potential and vortical flow, Fluid object interaction, Fluid structure interaction, Turbulent flow (Large-Eddy simulation)

EDUCATION

University of Michigan, Ann Arbor, MI

Ph.D. Naval Architecture & Marine Engineering — January 2017
Research topic: A Velocity Decomposition Approach for Three-Dimensional Unsteady Viscous Flow at High Reynolds Number
Advisor: Prof. Kevin Maki

M.S.E. Naval Architecture & Marine Engineering (GPA: 3.84/4.00) — June 2013

Harbin Engineering University, Harbin, China

B.S.E. Naval Architecture & Ocean Engineering (GPA: 3.44/4.00) — June 2011

PROFESSIONAL EXPERIENCE

Research Assistant — September, 2013 - Present
CSHL (Computational Ship Hydrodynamics Lab) — University of Michigan — *Ann Arbor, MI*

- Design the velocity decomposition algorithm to solve unsteady flow problems to achieve both the accuracy of viscous flow methods (field methods) and the efficiency of potential flow methods (boundary-element methods).
- Develop a hybrid CFD (Computational-Fluid-Dynamics) solver in OpenFOAM to provide a solution method that is more accurate and efficient than conventional solvers, especially for high fidelity simulations (e.g. LES).

Research Intern — June, 2015 - August, 2015
Offshore & Environment Function — ExxonMobil Upstream Research Company — *Houston, TX*

- Applied CFD simulations (using STAR-CCM+) to wave impact on a structure to provide physical insight for developing future model tests and better structure designs.

- Developed CFD models to analyze various wave impact scenarios. Identified potential explanations of the physical mechanisms observed in model tests, such as air-pocket effect and random characteristics of wave impacts.

Research Assistant - Numerical Hydrodynamics May, 2012 - December, 2012
Marine Renewable Energy Lab (MRELab) — University of Michigan *Ann Arbor, MI*

- Developed a numerical hydrodynamic tool to predict the performance of the VIVACE (Vortex Induced Vibration for Aquatic Clean Energy) converter with multiple cylinders, and validated numerical solutions against experimental data.
- Utilized the numerical hydrodynamic tool to improve understanding of flow structures and vortex patterns in different operating conditions and to lower experimental cost.

Research Assistant - Hydrodynamics Analysis October, 2011 - April, 2012
Dept. of Naval Architecture & Marine Engineering — University of Michigan *Ann Arbor, MI*

- Analyzed experimental data of an innovative Surface-Piercing-Hydrofoil (SPH) design to identified hysteresis effect in transitional operating conditions
- Identified the relationship between the hysteresis effect and cavitation number, angle of attack in different operating conditions, to improve the SPH design

Shipyard and Design Intern Winter, 2011
Hudong-Zhonghua Shipbuilding *Shanghai, China*

- Gained experience in the construction process of container ships and bulk carriers. Assisted in the detail design process.

PROJECTS

CFD Modeling for Lubrication Winter, 2016 - present
University of Michigan *Ann Arbor, MI*

- Develop a CFD solver (in OpenFOAM) for squeeze film flow simulations based on OpenFOAM CFD libraries. An iterative algorithm is designed and implemented to simulate the real force control strategy.
- A new mesh motion solver is developed to maintain high-quality mesh around complicated geometries during the simulation
- The solver is validated against analytical solutions and shows excellent agreement. Further development for multi-physics simulation, such as multi-phase flow in squeeze film, asperity contact and so on, are underway.

Linear and Non-Linear Wave theories Comparison Study March, 2011 - June, 2011
Harbin Engineering University *Harbin, China*

- Quantified the importance of the nonlinear wave effects for different wave parameters through comparison of results generated based on different wave theories
- Provided suggestions on selecting wave theory to generate waves for different regimes of wave parameters

Biomimetic Robotic Fish with Flexible Pectoral Fins October, 2008 - March, 2011
National University Student Innovation Program *Harbin, China*

- Designed and built a biomimetic robotic fish propelled by flexible pectoral fins. Improved the maneuverability over conventional caudal fin propulsion
- Analyzed hydrodynamic performance and structural strength using FLUENT and PATRAN and optimized the design based on the simulation results

SKILLS

CAE: OpenFOAM, FLUENT, STAR-CCM+, CFX, Aegir, Pointwise, Gambit, ICEM, ANSYS, PATRAN
CAD & other: Rhino3D, AutoCAD, ParaView, LaTeX , Gnuplot, Vim, Git
Programing language: C++, FORTRAN, Python, MATLAB, Bash scripting, PBS for HPC, Excel VBA
Language: Fluent in English, native speaker of Mandarin and Cantonese

AWARDS & HONORS

National University Student Innovation Program Award	March, 2011 (Harbin, China)
Excellent Student Award	October, 2010 (Harbin, China)
Scholarship for Outstanding Academic Record	November, 2010 (Harbin, China)
Scholarship for Outstanding Academic Record	November, 2009 (Harbin, China)

MEMBERSHIP & EXTRACURRICULAR

Student member of Society of Naval Architect and Marine Engineer (SNAME)	2011 - present
Coordinator of International Association of Ocean Engineers (IAOE)	2015 - present
Volunteer of Houston Food Bank	2015 - present (Houston, TX)
Volunteer of Guangdong Disabled Persons' Federation	2008 - 2009 (Zhuhai, China)
Organizer of the English Club	2007 - 2010 (Harbin, China)
Student tutor of the "Star Light " organization	2007 - 2009 (Harbin, China)

PUBLICATIONS AND TECHNICAL REPORTS

- Yang Chen and Kevin J Maki. A velocity decomposition approach for three-dimensional unsteady flow. *European Journal of Mechanics-B/Fluids*, 62:94–108, 2017
- Yang Chen, Kevin J Maki, and William J Rosemurgy. A Velocity Decomposition Approach for Unsteady Flow. In *ASME 2015 34th International Conference on Offshore Mechanics and Arctic Engineering*. American Society of Mechanical Engineers, 2015
- Yang Chen. A Velocity Decomposition Approach for Unsteady flow. Master's thesis, University of Michigan, 2014
- Lin Ding, Yang Chen, Kim Eun Soo, and Michael M Bernitsas. 2-D URANS vs. Experiments of Flow Induced Motions of Multiple Circular Cylinders With Passive Turbulence Control. In *Proceedings of the 32nd OMAE 2013 Conference*. Paper #10911, Nantes, France, June 9-14, 2013

PRESENTATIONS

- Yang Chen and Kevin J Maki. "A Velocity Decomposition for Three-Dimensional Unsteady Flows". ONR (Office of Naval Research) Review Meeting. Honolulu, HI, April 2016
- Yang Chen. "Study on Wave Impact Using CFD Simulations". ExxonMobil URC (Upstream Research Company) Project Review Meeting. Houston, TX, August 2015
- Yang Chen, Kevin J Maki, and William J Rosemurgy. "A Velocity Decomposition Approach for Unsteady Flow". ASME 2015 34th International Conference on Offshore Mechanics and Arctic Engineering. St. John's, Newfoundland and Labrador, Canada, May 2015