HAIDONG LU

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- **Nearly 15 years of experience on programming and application of CFD tools**, focused on free-surface flow and non-linear fluid-structure interaction problems:
  ship motion in extreme waves, *wave-body interactions*, *sloshing*, *wave-in-deck loads*, and *mooring analysis*.
- **More than 10 years of experience in offshore engineering**:
  — Numerical analysis on hydrodynamics:
  moonpool simulation, *damping prediction of FPSO*, and *sloshing analysis for FLNG/FLPG*;
  — Global dynamic analysis of umbilicals/risers for FPS in deep sea;
  — Offshore T&I operation analysis:
  load-out and transportation, *towing*, *offshore installation and mooring*.

Strong competencies in hydrodynamics and marine analysis using: ANSYS FLUENT, OpenFOAM, MOSES, sima/RIFLEX (SESAM) and WAMIT. Good knowledge of applicable codes and guidelines for offshore floating units design and T&I operations.

Proficient in FORTRAN, MATLAB and script programming on both *Linux* and *Windows*; working experience in data processing and analysis using Excel VBA, Python and C++.

❖ *Education*

2004 - 2010 **George Mason University**, Fairfax, Virginia, USA
Ph.D. in Computational Sciences & Informatics (*on CFD*), 2010.

1997 - 2004 **University of Shanghai for Science and Technology**, Shanghai, China
M.Eng. in Fluid Machinery & Engineering, 2004;
B.Eng. in Fluid Mechanics, 2001.

❖ *Experience*

09/01/2022 - present **Prairie View A&M University**, Prairie View, TX
Postdoctoral Researcher, Center for Energy and Environmental Sustainability

- Offshore wind energy:
  □ Dynamic analysis on floating offshore wind turbines using OrcaFlex,
  □ Post-processing of data using Python.

02/2016 - 03/2020 **China Merchants Industry Holdings**, China

Sr. Marine Engineer, **CMHI (Jiangsu)**, 02/2016 - 03/2020

- Technical review/verification and engineering support on projects of China Merchant Heavy Industry (Jiangsu), a subsidiary shipyard of the CMIH group on:
  □ Quayside loadout and mooring analyses,

□ Stability analysis/verification for newly designed vessels, including *heavy lifting crane vessels*, *lift-boats*, *drilling semi*, *crane barges*, etc.,
□ Towing analysis in restricted water: *e.g.*, *floating drydock*, *heavy lift vessels*,
□ Hydrodynamic analysis/review on new concept designs as well as for bid support.

Assistant General Manager, **CM-OTRC**, 03/2017 - 03/2020

- Leading and participating in research projects at CM-OTRC, the designated R&D center on offshore technologies within CMIH group, including:
  □ High Performance Computing facility (configuration and testing of a new in-house server on CFD applications),
  □ Design of offshore wind turbine transportation and installation vessels, and
  □ Design and analysis for a new deep-water riser system.
- Supporting the general manger of CM-OTRC on:
  strategic planning of R&D for CMIH, research proposals for key technologies in offshore industry, overview of project executions, general administration, etc.

06/2015 - 01/2016 **Novellant Engineering Services LLC**, Katy, TX
Principal Naval Architect/Marine Engineer

- Prepared proposals for projects in Oil & Gas industry,
- Provided technical support on marine engineering (offshore T&I operations),
- Conducted numerical hydrodynamic analysis using CFD.

10/2012 - 04/2015 **MARINTEK USA Inc.**, Houston, TX
Research Scientist

- Global dynamic analysis for umbilical/riser design using RIFELX/sima (commercialized as SESAM software by DNV):
  □ Deep-water umbilicals/risers for FPS units for fatigue and extreme sea states,
  □ Third-party verification analysis on umbilical/riser design.
- CFD modeling for hydrodynamic problems using OpenFOAM:
  □ Development of a 3-D numerical wave tank with artificial damping beaches,
  □ Project-based investigation of damping coefficient calculation for cylindrical FPSO vessel,
  □ Modeling of moonpool problem for a simplified drilling vessel model,
  □ Modeling of tank sloshing.
- Other hydrodynamic analysis:
  □ Re-evaluation of air-gap problem on fixed platforms in extreme sea condition.

05/2010 - 10/2012 **Ocean Dynamics LLC (Dockwise)**, Houston, TX
Sr. Naval Architect/Marine Engineer

- Marine analyses for transportation and installation operations using MOSES:
  □ Hydrostatic calculation for "*Cheviot Topside T&I – Marine Analysis*", 2011-2012,
  □ Barge towing calculation and analysis for "*Midsize T-shape Design*"(internal), 2011,
  □ Entry and exit analyses during float-over installation for "*Bongkok 4A Verification*", 2011,
  □ Topsides float-over installation for "*Cheviot Float-over Concept Design*", 2010,

□ Loadout and transportation analysis for "*Liwan 3-1 Jacket Design*", 2010.

- Mooring analysis using MOSES:
  □ Topsides standby mooring analysis for "*Woodside Browse Bid Support*", 2011,
  □ Mooring analysis for a SPAR with a semi tender rig nearby for "*Kikeh Project*", 2011.
- Hydrodynamic calculations/analyses:
  □ Scouring problem around a moored barge in shallow water for "*Corocoro CPF Project*", 2011,
  □ CFD modeling on "*FLNG/FLPG Sloshing Verification Analysis*" using *ANSYS FLUENT*,
  □ Investigation of slamming load for onboard thruster cover design.

12/2009 - 05/2010 **Center for Computational Fluid Dynamics, GMU**, Fairfax, VA
Research Associate

- Implementation of an FEM code for mooring analysis using FORTRAN,
- Further validation of a numerical wave tank: "*Numerical Simulation of Sloshing Problem*" for a 2-D sloshing tank,
- CFD applications on *green water* problems: "*Validation on Green Water Problems*".

08/2004 - 11/2009 **Center for Computational Fluid Dynamics, GMU**, Fairfax, VA
Graduate Research Assistant

- CFD simulations on hydrodynamic interactions between two vessels with different mooring configurations: *"Numerical Analysis of FPSO/LNG Carrier Motions in Head Waves"*,
- Implemented and validated a numerical wave tank with in-house CFD code, including:
  □ "*Numerical Study of Green Water Effects on an FPSO Model in Different Head Waves"*,
  □ "*Computation of 3-D Free-Surface Flow about a Ship at Constant Speed in Calm Water"*,
  □ "*Numerical Simulation of a 3-D Flying Fish In or Near the Free Surface"*, with MATLAB utilized for complex geometry smoothing.

02/2001 - 06/2004 **Institute of Fluid Mechanics, USST**, Shanghai, China
Graduate Research Assistant

- Laboratory investigation of a multi-phase flow: *"Experimental Study on Dense Pneumatic Conveying in Pipe-lines*",
- CFD analysis using *PHOENICS 3.3*: *"3-D Numerical Analysis of the Flow in a Rotary Diffuser"*.

❖ *Publications*

- Sing-kwan Lee, Zicheng Chen, Qi Pan, **Haidong Lu**, and Lixin Xu. "Hydrodynamic Design of SWATH for Offshore Wind Turbine Transportation and Installation", ISOPE2020, Shanghai, China, October 11-16, 2020.

- Yaguang Jiao, Xiaoyan Long, Lixin Xu, **Haidong Lu**, Feng Jiang and Quanming Miao. "Numerical Studies on Lateral Responses of Top-Finned TLP Foundation Piles", ISOPE2020, Shanghai, China, October 11-16, 2020.

- Csaba Pakozdi, Anders Östman, Carl Trygve Stansberg, Milovan Peric, **Haidong Lu** and Rolf Baarholm. "Estimation of Wave in Deck Load Using CFD Validated against Model Test Data", ISOPE2015, Kona, Hawaii, USA, June 21 – 26, 2015.

- Yusong Cao, **Haidong Lu**, and Fuwei Zhang. "A Study on Effect of Liquid Motion in a Fully-filled Tank on Moment on Vessel", ISOPE2013, Anchorage, Alaska, USA, June 30 – July 5, 2013.

- **Haidong Lu**, Chi Yang and Rainald Löhner. "Numerical Studies of Green Water Impact on Fixed and Moving Bodies", ISOPE2010, Beijing, China, June 20-26, 2010; later, revised and published in International Journal of Offshore and Polar Engineering, Vol. 22, No. 1, March, 2012, pp. 1-10.

- Yusong Cao, Mateusz Graczyk, Csaba Pakozdi, **Haidong Lu**, Fuxin Huang, and Chi Yang. "Sloshing load due to liquid motion in a tank (Comparison of potential flow, CFD, and Experiment solutions)", ISOPE2010, Beijing, China, June 20-26, 2010.

- **Haidong Lu**, Chi Yang and Rainald Löhner. "Numerical Studies of Ship-Ship Interactions in Extreme Waves", The 2009 Conference on Grand Challenges in Modeling and Simulation (GCMS'09), Istanbul, Turkey, July 13-16, 2009.

- Chi Yang, **Haidong Lu**, Rainald Löhner, Xiufeng Jiang and Jianmin Yang. "Numerical Study on Highly Nonlinear Hydrodynamic Interactions of Two Side-by-Side Moored Vessels in Extreme Waves", Proceedings of Deepwater Offshore Technology Symposium 2008 (DTec2008), Shanghai, China, November 17-19, 2008.

- **Haidong Lu**, Chi Yang and Rainald Löhner. "Numerical Studies of Green Water Effect on a Moored FPSO", ISOPE2008, Vancouver, Canada, July 6-11, 2008.

- Chi Yang, **Haidong Lu**, Rainald Löhner and William C. Sandberg. "Computation of the ThreeDimensional Nonlinear Flow around a Body In or Near the Free Surface", OMAE2008, Estoril, Portugal, June 15-19, 2008.

- Chi Yang, **Haidong Lu**, Rainald Löhner, Xiufeng Jiang and Jianmin Yang. "Numerical Simulation of Highly Nonlinear Wave-Body Interactions with Experimental Validation", International Conference on Violent Flows, Fukuoka, Japan, November 20-22, 2007.

- Xiufeng Jiang, Jianmin Yang, Chi Yang, **Haidong Lu** and Rainald Löhner. "Numerical and Experimental Study of Green Water on a Moving FPSO", 9th International Conference on Fast Sea Transportation, Shanghai, China, September 23-27, 2007.

- Chi Yang, **Haidong Lu**, Rainald Löhner, Xiufeng Jiang and Jianming Yang. "An Unstructured-Grid Based VOF Method for Ship Motions Induced by Extreme Waves", Proceedings of the 9th International Conference on Numerical Ship Hydrodynamics, Ann Arbor, Michigan, August 5-8, 2007.

- Chi Yang, Rainald Löhner and **Haidong Lu**. "An Unstructured-Grid Based Volume-of-Fluid Method for Extreme Wave and Freely-Floating Structure Interaction", Journal of Hydrodynamics, Vol. 18, No. 3, S. 1, 2006, pp. 415-422.

- Jun Zhao, Shougen Hu, **Haidong Lu** and Zongming Liu. "Study on the Dense-phase Pneumatic Conveying of Fly Ash and Process Control", 6th International Conference on Measurement and Control of Granular Materials, Shanghai, China, August 20-22, 2003.