Tobias Martin

Curriculum Vitae

Personal details

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Research Interests

Fluid-structure interaction, Hydroelasticity, Multiphase flows, Computational fluid dynamics, Structural dynamics, Numerical methods

Education

Since 01/2021 **Studies in Philosophy**, *University of Oslo*, Norway, *ECTS-Grade A (average)*
In English: Exphil. In Norwegian: bachelor courses in metaphysics, philosophy of science, logic, ethics and environmental philosophy.

08/2017 – 07/2021 **Doctoral Research Fellow**, *Department of Civil and Environmental Engineering, Norwegian University of Science and Technology, Trondheim*, Norway
Thesis: A new CFD-based framework for modelling the interaction of open ocean aquaculture structures and complex free surface hydrodynamics (defended 17.06.2021).

10/2014 – 09/2016 **Master of Science in Ship Technology and Ocean Engineering**, *University of Rostock*, Germany, *Grade 1.0 (equals ECTS-Grade A)*
Specialization in Numerical hydrodynamics and Ocean Engineering. Master thesis (30 CP): *Development of a finite volume solver for two-phase incompressible flows using a level set method* (Grade 1.0).

10/2011 – 09/2014 **Bachelor of Science in Mechanical Engineering**, *University of Rostock*, Germany, *Grade 1.4 (equals ECTS-Grade A)*
Specialization in Ship Technology and Ocean Engineering.

Academic Positions

08/2021 – 02/2022 **Postdoctoral researcher**, *Department of Civil and Environmental Engineering, Norwegian University of Science and Technology, Trondheim*, Norway
KPN project about improving ship emissions in waves. Co-supervision of one PhD student (unofficial).

11/2016 – 04/2017 **Research assistant**, *Chair of Ocean Engineering, University of Rostock, Germany*
Industry project about the optimisation of the acoustic emission and fluid flow around underwater vehicles.

07/2015 – 09/2016 **Student research assistant**, *Chair of Modelling and Simulation, University of Rostock, Germany*
Implementation of numerical methods for fluid flows in open-source software OpenFOAM.

Research projects

2020 (ongoing) **Improving Ship Performance in Real Sea States**, *Research Council of Norway KPN project*, 15 Mio NOK, 1 PhD and 1 PostDoc position. Project partner: SINTEF Ocean
Role: Contribution to proposal writing, PostDoc position.

2020 (ongoing) **Solutions to Current and Future Problems on Natural and Constructed Shorelines, Eastern Baltic Sea**, *Estonia-Norway EEA grant*, 9 Mio NOK, 1 researcher position. Project partner: University of Tallinn
Role: Contribution to proposal writing.

2017 – 2021 **High Resolution Numerical Modelling of Flexible Fish Cage Structures**, *Resarch Council of Norway Havbruk TOPPFORSK project*, 11.9 Mio NOK, 1 PhD, 1 PostDoc and 1 researcher position. Project partners: SINTEF Ocean, IIT Bombay, University of Hannover.
Role: PhD student.

Research experience

2018 – 2022 **Proposal Writing**
Contribution to six proposal writings for calls of the Research Council of Norway, EEA and ERC. Three proposals were successful (1 KPN, 1 EEA, 1 ERC Consolidator).

2018 – 2022 **Reviewer**
Reviewer for several research articles for the OMAE conferences since 2018, JOMAE, Ocean Engineering, Journal for Marine Science and Engineering and Journal of Fluids and Structures.

06/2019 **Session Co-Chair**, *38th International Conference on Ocean, Offshore & Arctic Engineering (OMAE)*, Glasgow, Scotland, UK
Co-chair in session on free surface loading and structure interaction within the symposium on CFD & FSI.

2017 – 2022 **Co-supervisor**, *Co-supervisor of five Master theses and one project thesis at NTNU*

2017 – 2022 **Lecturer**, *Department of Civil and Environmental Engineering, NTNU, Norway*
Teaching in the courses "Coastal Engineering" (spring semesters) and "Dynamic Response to Irregular Loadings" (fall semesters) for Master students.

12/2016 – 07/2017 **Workshop Organiser**, *University of Rostock, Germany and NTNU, Norway*
Three workshops on the topic of introducing the finite volume methods in OpenFOAM.

Peer-reviewed Journal Articles

In total, 147 citations and h-index 7.

2022 **Martin, T. et al.** Modelling Open Ocean Aquaculture Structures using CFD and a Simulation-based Screen Force Model. *Journal of Marine Science and Engineering*, doi: 10.3390/jmse10030332.

2022 **Dempwolff, L.-C., Martin, T. et al.** Loads and effects of ship-generated, drawdown waves in confined waterways - A review of current knowledge and methods. *Journal of Coastal and Hydraulic Structures*, doi: 10.48438/jchs.2022.0013.

2022 **Wang, G., Martin, T. et al.** An improved screen force model based on CFD simulations of the hydrodynamic loads on knotless net panels. *Applied Ocean Research*, doi: 10.1016/j.apor.2021.102965.

2022 **Wang, G., Martin, T. et al.** Numerical investigation of the hydrodynamics of a submersible steel-frame offshore fish farm in regular waves using CFD. *Ocean Engineering*, doi: 10.1016/j.oceaneng.2022.111528.

2021 **Martin, T. and Bihs, H.** A CFD approach for modelling the fluid-structure interaction of offshore aquaculture cages and waves. *Journal of Offshore Mechanics and Arctic Engineering*, doi: 10.1115/1.4052421.

2021 **Martin, T. and Bihs, H.** A numerical framework for modelling the dynamics of open ocean aquaculture structures in viscous fluids. *Applied Ocean Research*, doi: 10.1016/j.apor.2020.102410.

2021 **Martin, T. and Bihs, H.** A non-linear implicit approach for modelling the dynamics of porous tensile structures interacting with fluids. *Journal of Fluids and Structures*, Vol. 100, doi: 10.1016/j.jfluidstructs.2020.103168.

2021 **Martin, T. and Bihs, H.** A numerical solution for modelling mooring dynamics, including bending and shearing effects, using a geometrically exact beam model. *Journal of Marine Science and Engineering.* Vol. 9(5), doi:10.3390/jmse9050486.

2021 **Martin, T. et al.** Numerical Modelling of the Interaction of Moving Fish Nets and Fluid. *Journal of Offshore Mechanics and Arctic Engineering*, doi:10.1115/1.4051088 .

2021 **Wang, G., Martin, T. et al.** Modelling the flow around and wake behind net panels using Large Eddy Simulations. *Ocean Engineering*, doi: 10.1016/j.oceaneng.2021.109846.

2021 **Gärtner, J., Kronenburg, A. and Martin, T.** Efficient WENO library in OpenFOAM. *SoftwareX*, Vol. 12, doi:10.1016/j.softx.2020.100611.

2020 **Wang, W., Martin, T. et al.** An Improved Depth-Averaged Non-Hydrostatic Shallow Water Model with Quadratic Pressure Approximation. *Int. J. Numer. Meth. Fluids*, doi: 10.1002/fld.4807.

2020 **Wang, W., Kamath, A., Martin, T. and Bihs, H.** A Comparison of Different Wave Modelling Techniques in An Open-Source Hydrodynamic Framework. *J. Mar. Sci. Eng,* Vol. 8(7), doi: 10.3390/jmse8070526.

2020 **Martin, T. et al.** Accurate modelling of the interaction of constrained floating structures and complex free surfaces using a new quasi-static mooring model. *International Journal of Numerical Methods in Fluids*, doi: 10.1002/fld.4894.

2020 **Martin, T. et al.** A Lagrangian approach for the coupled simulation of fixed net structures in a Eulerian fluid model. *Journal of Fluids and Structures*, Vol. 94, doi: 10.1016/j.jfluidstructs.2020.102962.

2020 **Martin, T. et al.** Modeling and Simulation of Moored-Floating Structures Using the Tension Element Method. *Journal of Offshore Mechanics and Arctic Engineering*, Vol. 142(1), doi: 10.1115/1.4044289.

2018 **Martin, T. et al.** Efficient Implementation of a Numerical Model for Flexible Net Systems. *Ocean Engineering*, Vol. 150, p 272-279.

2018 **Martin, T. and Shevchuk, I.** Implementation and Validation of Semi-implicit WENO Schemes using OpenFOAM. *Computation*, Vol. 6(1).

Peer-reviewed Conference Proceedings

2021 **Martin, T. and Bihs, H.** A CFD approach for modelling the fluid-structure interaction of offshore aquaculture cages and waves. *40th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2021.*

2021 **Pakozdi, C., Kamath, A., Wang, W., Martin, T. and Bihs, H.** Efficient Calculation of Spatial and Temporal Evolution of Hydrodynamic Loads on Offshore Wind Substructures. *40th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2021.*

2021 **Kamath, A., Martin, T. and Bihs, H.** Numerical Simulation of A Floating Moored Buoy in Waves using Direct Forcing Immersed Boundary Method in REEF3D. *40th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2021.*

2021 **Wang, G., Martin, T. et al.** A Numerical Study of the Hydrodynamics of an Offshore Fish Farm using REEF3D. *40th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2021.*

2021 **Wang, W., Pakozdi, C., Kamath, A., Martin, T. and Bihs, H.** Hydrodynamic Coupling of Viscous and Non-Viscous Numerical Wave Solutions Within the Open-Source Hydrodynamics Framework REEF3D. *40th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2021.*

2021 **Windt, C., Martin, T., Bihs, H. and Goseberg, N.** Validation of a numerical model for the investigation of tension leg platforms with floating offshore wind application using REEF3D. *40th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2021.*

2020 **Martin, T. et al.** Numerical Modelling of the interaction of moving fish nets and fluid. *39th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2020.*

2020 **Wang, G., Martin, T. et al.** Numerical Simulation of Hydrodynamics around Net Meshes using REEF3D. *39th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2020.*

2019 **Martin, T. et al.** Numerical Modelling of the Interaction between a Fish Net and Fluid using CFD. *8th International Conference on Computational Methods in Marine Engineering, MARINE 2019.*

2019 **Dempwolff, L.-C., Martin, T. et al.** Numerical and Experimental Investigation of Moored-Floating Structures in Regular Waves. *8th International Conference on Computational Methods in Marine Engineering, MARINE 2019.*

2019 **Martin, T. et al.** Numerical Modelling of Net Motion in Waves and Current using CFD. *38th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2019.*

2019 **Aggarwal, A., Martin, T. et al.** Numerical Study of Breaking Waves and Associated Wave Forces on a Jacket Substructure for Offshore Wind Turbines. *38th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2019.*

2019 **Bihs, H., Wang, W., Martin, T. and Kamath, A.** REEF3D::FNPF: A Flexible Fully Nonlinear Potential Flow Solver. *38th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2019.*

2019 **Kamath, A., Martin, T. and Bihs, H.** Numerical Modelling of Wave Interaction With an FPSO Under Different Incident Wave Conditions. *38th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2019.*

2018 **Martin, T. et al.** Modelling and Simulation of Moored-floating Structures using the Tension-Element-Method. *37th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2018.*

2018 **Martin, T. et al.** Numerical Simulation of Interactions between Water Waves and a Moored-Floating Breakwater. *36th Conference on Coastal Engineering, ICCE 2018.*

2018 **Martin, T. et al.** Simulation of Floating Bodies in Waves and Mooring in a 3D Numerical Wave Tank using REEF3D. *4th International Conference in Ocean Engineering (ICOE2018).*

Awards and Scholarships

11/2016 **"VDI-Studienpreis MV 2016"**, *Mecklenburg-West Pomerania, Germany*
Award granted for high academic record to the best graduate in engineering science 2016.

10/2015 – 09/2016 **"Deutschlandstipendium"**, *University of Rostock, Germany*
Scholarship awarded for high academic record and special personal achievements.

Computer Skills

Operating systems: Debian GNU/Linux, MacOS, Windows.

Software: Microsoft Office, Matlab, Latex, Git, Vim, ParaView, REEF3D, OpenFOAM, ANSYS CFX, Star-CCM+.

Programming: C/C++, MPI, Python.

Languages

German: Mother-tongue.

English: Very good written and oral skills. (TOEFL iBT Test Score 109/120).

Norwegian: Good written and oral skills (Trinn 3: Grade A).

References are available on request.