MARIN LAUBER

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Born 28th August 1994 ⋄ Swiss
Kedoestraat 39 ⋄ 2022EM Haarlem

INTRODUCTION

I am a passionate researcher in computational mechanics from Switzerland. My expertise lies in the computational fluid-structure interaction of highly deformable and lightweight membranes and shells. I have experience developing high-fidelity computational methods (finite-volume, finite-element, isogeometric analysis) for coupled problems and applying them to challenging engineering problems. I also have experience with data-driven approaches for data analysis and high-performance computing with graphics cards. Finally, I am an avid sailor, and I have an interest in sailing yacht performance prediction.

EXPERIENCE

Post-doctoral researcher at TU Delft   September 2024 - Present
Technische Universiteit Delft   *Delft, Netherlands*

· Post-doctoral researcher within the Biomechanical Engineering research group, working on numerical modelling of prostethic human heart.
Head of the lab: Dr. Mathias Peirlinck

Post-doctoral researcher at TU Delft   February 2023 - September 2024
Technische Universiteit Delft   *Delft, Netherlands*

· Post-doctoral researcher within the Ship Hydromechanics research group, working on fluid-structure interaction of thin membranes and shells applied to sail-assisted propulsion.
Head of the lab: Prof. Gabriel D. Weymouth

Doctoral researcher at the University of Southampton   Septembre 2018 - February 2023
Univeristy of Southampton   *Southampton, UK*

· Doctoral researcher within the Maritime Engineering research group, working of fluid-structure interaction of thin membranes and shells.
Head of the lab: Prof. Gabriel D. Weymouth

Visiting PhD Student at the Unsteady Flow Diagnostic Lab   September 2021 - May 2022
Ecole Polytechnique Fédérale de Lausanne   *Lausanne, Switzerland*

· Visit organized for the last year of my Ph.D., allowed me to work with experimental researchers on validating the numerical model developed during my Ph.D. on a heaving flexible swimmer undergoing complex accelerations.
Head of the lab: Prof. Karen Mulleners

Development of a Velocity Prediction Program   March 2020 - Present

Side project

· Development of an open-source 3 degrees of freedom velocity prediction program (non-linear multivariate constraint optimization problem) in Python. See: github.com/marinlauber/Python-VPP

EDUCATION

PhD in Next Generation Computational Modelling   *September 2018 - February 2023*

University of Southampton   *Southampton, UK*

Thesis: Computational Fluid-Structure Interaction of Membranes and Shells with Application to Bat Flight

Taught Year: Lectures in Simulation and Modelling, Numerical Methods, Statistical Analysis, Computational Methods, Advanced Finite-Element Analysis, Partial Differential Equations, Integral Transform Methods.

Experience Gained: Development of a finite-volume (LES) Cartesian grid fluid flow solver (Fortran) to simulate thin, flexible sheets/membranes in an unsteady flow. Coupling of the finite-volume code to a finite-element solver (CalculiX) through the preCICE library to simulate weak and strongly coupled fluid-structure interaction problems.

MSc in Maritime Computational Fluid Dynamics   *September 2017 - September 2018*

University of Southampton   *Southampton, UK*

Thesis: Acquisition of Manoeuvring Characteristics of Ships using RANS CFD

Overall grade: *First Class*

Lectures in Turbulence, Computational Fluid Dynamics, Aeroelasticity, Ship Resistance and Propulsion, Finite-Element Analysis, Hydrodynamics, and Fluid-Structures Interactions.

Experience Gained: Performing static drift and planar motion mechanism simulation of ship manoeuvring using a commercial CFD package (Star-CCM) using overset meshes.

BEng in Yacht & Powercraft Design   *September 2014 - September 2017*

Southampton Solent University   *Southampton, UK*

Final Year Project: Preliminary Design of a Mini 6.50 with a Foil CFD Investigation

Award: The 2017 RINA - BAE Systems Student Naval Architect Award - Final Year Project

Overall grade: *First Class with Honours*

Certificat de Maturité Gymansiale   *August 2010 - September 2014*

Gymnase de Morges   *Morges, Switzerland*

Option: Physics & Applied Mathematics, Economy   Overall grade: 4.1/6

LIST OF PUBLICATIONS

First-author Paper (peer-reviewed)

· Lauber M., Weymouth G.D. (2024) *Isogemetric analysis of filaments sedimentation*, Journal of Fluid Mechanics, *draft*

· Lauber M., Weymouth G.D., Limbert G. (2023) *Rapid flapping and fiber-reinforced membrane wings are key to high-performance bat flight*, Journal of the Royal Society Interface, `10.1098/rsif.2023.0466`

· Lauber M., Weymouth G.D., Limbert G. (2023) *Immersed boundary fluid structure interaction of membranes and shells*, Proceeding of the XII Conference on structural dynamics, `10.48550/arXiv.2308.06494`

· Lauber M., Weymouth G.D., Limbert G., (2022) *Immersed boundary simulations of flows driven by moving thin membranes*, Journal of Computational Physics, `10.1016/j.jcp.2022.111076`

Co-Author Papers (peer-reviewed)

· Weymouth G.D., Lauber M. (2024) *Far-field boundary conditions for Cartesian grid simulations*, Journal of Computational Physics, *draft*

· Byrne C., Dickson T., Lauber M., Cairoli C., Weymouth G.D. (2022) *Using Machine Learning to Model Yacht Performance*, Journal of Sailing Technology, `10.5957/jst/2022.7.5.104`

Conferences

· Lauber M., Li J., Verhelst H.M (2024) *Gismo & WaterLily adapters for the preCICE coupling library*, 16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics, Vancouver, Canada

· Buchner, A.J., Lauber M., de Boer D.; Cribellier A., Muijres F. (2024) *The low amplitude wing beating of mosquitoes and its effect on wing-wake interaction*, 1st European Fluid Dynamics Conference, Aachen, Germany.

· Lauber M., Weymouth G.D. (2024) *Fast Fluid-Structure Interaction in Minimal Domains with Potential-Flow Boundary Conditions*, Third Direct In-person Colloquium on Vortex Dominated Flows (DisCoVor), Delft, Netherlands.

· Lauber M., Weymouth G.D (2023) *Strongly-coupled fluid-structure interaction of lightweight membranes and shells*, American Physical Society - Division of Fluid Dynamics Annual Meeting 2024, Washington-DC, USA.

· Weymouth G.D, Lauber M. (2023) *High-performance bat flight simulations using parametric kinematic and material models*, Bio-inspired aerial and aquatic locomotion workshop 2023, Les Houches School of Physics, France.

· Lauber M., Weymouth G.D., Limbert G., (2023) *Strouhal and Membrane Elasticity effects on bat flight*, Second Direct In-person Colloquium on Vortex Dominated Flows (DisCoVor), Breckenridge, USA.

· Lauber M., Weymouth G.D., Limbert G., (2022) *Development and application of an immersed boundary fluid-membrane interaction solver*, First Direct In-person Colloquium on Vortex Dominated Flows (DisCoVor), Villars-sur-Ollon, Switzerland.

· Lauber M., *Flexible sheets in Turbulent flow*, UK Fluid 2021, Southampton, UK

· Lauber M., Weymouth G.D. (2020) *Improving Pressure Simulations Driven by Immersed Dynamic Surfaces.* 73rd Annual Meeting of the APS Division of Fluid Dynamics, Chicago, USA.

REFERENCES

Prof. Gabriel D. Weymouth
PhD advisor   *contact: g.d.weymouth@tudelft.nl*

· Professor of Ship Hydromechanics at the Delft University of Technology

Prof. Georges Limbert
PhD advisor   *contact: g.limbert@soton.ac.uk*

· Professor of Computational Mechanics at the University of Southampton

AWARDS

Best Early Career Paper Award
XII International Conference on Structural Dynamics   *2023*

· For the paper: *Immersed boundary fluid-structure interaction of membranes and shells*

Best Career Paper Award
XII International Conference on Structural Dynamics   *2023*

· For the paper: *Immersed boundary fluid-structure interaction of membranes and shells*

RINA - BAE Systems Student Naval Architect Award - Final Year Project
Royal Institution of Naval Architects   *2017*

· Awarded for the project: *Preliminary Design of a Mini 6.50 with a Foil CFD Investigation*

SKILLS

Languages	French (native), English (proficient user), German (independent user)
Programming	Julia (MPI, CUDA), Fortran (OpenMP, MPI), Python, C, Matlab, git, github
Modeling	Autocad, Rhinoceros 5, Maxsurf (modeler, stability, seakeeping, structure), Solidworks
CFD	Star-CCM, Ansys Fluent, Ansys CFX, OpenFOAM
FEA	CalculiX, ABAQUS, Ansys APDL
Experimental	Towing Tank (resistance, seakeeping)
Other	HullScant (ISO 12215), WinDesign (VPP)

ADDITIONAL INFORMATIONS

Interests	Sailing, kitesurfing, skiing
Driving Licence	A1, B , Sailing & motor yachts (Swiss)