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Current position

11/2017 – Assistant Professor
Department of Mechanical Engineering, Massachusetts Institute of Technology, USA

Experience

05-2015 – 11/2017 Postdoctoral Fellow
School of Engineering and Applied Sciences, Harvard University, USA
Supervisor: Prof. L. Mahadevan

09/2014 – 12/2014 Postdoctoral Scientist
Computational Science and Engineering Laboratory, ETH Zurich, Switzerland
Supervisor: Prof. P. Koumoutsakos

12/2013 – 02/2014 Guest researcher
California Institute of Technology, USA

10/2009 – 03/2010 Visiting student
California Institute of Technology, USA

01/2008 – 10/2008 CFD researcher
Maritime Research Institute Netherlands (MARIN), Wageningen, the Netherlands

02/2007 – 05/2007 Internship
Stevens Institute of Technology, USA
Supervisor: Dr. L. Imas

Education

11/2008 – 09/2014 PhD
Computational Science and Engineering Laboratory, ETH Zurich, Switzerland
Supervisor: Prof. P. Koumoutsakos

04/2006 – 01/2008 MSc

Ship Hydromechanics, Delft University of Technology, the Netherlands
Supervisor: Prof. T. van Terwisga

09/2002 – 04/2006 BSc
Marine Technology, Delft University of Technology, the Netherlands

Grants and Awards

06/2020 DOE Early Career Award
Advanced Scientific Computing Research, U.S. Department of Energy

summer 2020 Summer Fellow in the ONR Summer Faculty Research Program
NSWC Carderock

06/2019 – Doherty Professorship in Ocean Utilization
MIT Sea Grant

11/2019 Gallery of Fluid Motion Poster Award
American Physical Society, Division of Fluid Dynamics (DFD)

11/2017 – 06/2019 Career Development Chair
American Bureau of Shipping

02/2019 – 08/2020 MISTI Seed Fund Grant
Massachusetts Institute of Technology

07/2018 – 07/2019 Research Support Committee Chang Award
Massachusetts Institute of Technology

02/2017 – 11/2017 Postdoctoral Fellowship
Advanced Mobility, Swiss National Science Foundation

05/2015 – 11/2016 Postdoctoral Fellowship
Early Mobility, Swiss National Science Foundation

Publications

E. Virost, V. Spandan, L. Niu, **W. M. van Rees**, L. Mahadevan, "Elastohydrodynamic Scaling Law for Heart Rates," *Physical Review Letters*, accepted

S. Mishra, **W. M. van Rees**, L. Mahadevan, "Coordinated crawling via reinforcement learning," *arXiv*, 2003.12845, 2020

G. K. Cuddalorepatta, **W. M. van Rees**, L. Han, D. Pantuso, L. Mahadevan, and J. J. Vlassak, "Poisson's ratio and residual strain of freestanding ultra-thin films," *Journal of the Mechanics and Physics of Solids*, vol. 137, p. 103821, 2020

- J. W. Boley*, **W. M. van Rees***, C. Lissandrello, M. N. Horenstein, R. L. Truby, A. Kotikian, J. A. Lewis, and L. Mahadevan, "Shape-shifting structured lattices via multi-material 4D printing," *Proceedings of the National Academy of Sciences*, vol. 116, no. 42, pp. 20856–20862, 2019
- W. M. van Rees**, E. A. Matsumoto, A. S. Gladman, J. A. Lewis, L. Mahadevan, "Mechanics of biomimetic 4D printed structures," *Soft Matter*, no. 43, pp. 8771–8779, 2018
- H.-Y. Chen, A. Sastry, **W. M. van Rees**, E. Vouga, "Physical Simulation of Environmentally-Induced Thin Shell Deformation," *ACM SIGGRAPH 2018*
- W. M. van Rees**, E. Vouga, and L. Mahadevan, "Growth patterns for shape-shifting elastic bilayers," *Proceedings of the National Academy of Sciences*, vol. 114, no. 44, pp. 11597–11602, 2017
- M. Scheeler, **W. M. van Rees**, H. Kedia, D. Kleckner, and W. T. M. Irvine, "Complete measurement of helicity and its dynamics in vortex tubes," *Science*, vol. 357, pp. 487–491, 2017
- G. Novati, S. Verma, D. Alexeev, D. Rossinelli, **W. M. van Rees**, and P. Koumoutsakos, "Synchronisation through learning for two self-propelled swimmers," *Bioinspiration & Biomimetics*, vol. 12, iss. 3, p. 36001, 2017
- F. Huhn, **W. M. van Rees**, M. Gazzola, D. Rossinelli, G. Haller, and P. Koumoutsakos, "Quantitative flow analysis of swimming dynamics with coherent Lagrangian vortices," *Chaos*, vol. 25, iss. 8, p. 87405, 2015
- W. M. van Rees**, M. Gazzola, and P. Koumoutsakos, "Optimal morphokinematics for undulatory swimmers at intermediate Reynolds numbers," *Journal of Fluid Mechanics*, vol. 775, pp. 178–188, 2015
- W. M. van Rees**, G. Novati, and P. Koumoutsakos, "Self-propulsion of a counter-rotating cylinder pair in a viscous fluid," *Physics of Fluids*, vol. 27, iss. 6, p. 63102, 2015
- D. Rossinelli, B. Hejazialhosseini, **W. M. van Rees**, M. Gazzola, M. Bergdorf, and P. Koumoutsakos, "MRAG-I2D: Multi-resolution adapted grids for remeshed vortex methods on multicore architectures," *Journal of Computational Physics*, vol. 288, pp. 1–18, 2015
- W. M. van Rees**, D. Rossinelli, P. Hadjidoukas, and P. Koumoutsakos, "High performance CPU/GPU multiresolution Poisson solver," in *Parallel Computing: Accelerating Computational Science and Engineering (CSE)*, pp. 481–490, 2014
- W. M. van Rees**, M. Gazzola, and P. Koumoutsakos, "Optimal shapes for anguilliform swimmers at intermediate Reynolds numbers," *Journal of Fluid Mechanics*, vol. 722, p. R3, 2013
- M. Gazzola, **W. M. van Rees**, and P. Koumoutsakos, "C-start: optimal start of larval fish," *Journal of Fluid Mechanics*, vol. 698, pp. 5–18, 2012
- W. M. van Rees**, F. Hussain, and P. Koumoutsakos, "Vortex tube reconnection at $Re=10^4$," *Physics of Fluids*, vol. 24, iss. 7, p. 75105, 2012

M. Gazzola, P. Chatelain, **W. M. van Rees**, and P. Koumoutsakos, "Simulations of single and multiple swimmers with non-divergence free deforming geometries," *Journal of Computational Physics*, vol. 230, iss. 19, pp. 7093-7114, 2011

W. M. van Rees, A. Leonard, D. I. Pullin, and P. Koumoutsakos, "A comparison of vortex and pseudo-spectral methods for the simulation of periodic vortical flows at high Reynolds numbers," *Journal of Computational Physics*, vol. 230, iss. 8, pp. 2794-2805, 2011

Invited talks

- 01/2020 **JFI Computations in Science Seminar**, University of Chicago, USA: "Theory, simulation, and design of thin elastic shape-shifting sheets"
- 08/2019 **New England Complex Fluid Workshop**, Waltham, MA, USA: "Simulation and inverse-design of thin shape-shifting structures"
- 07/2016 **JFI Theory Seminar**, University of Chicago, USA: "Gait and morphology optimizations for self-propelled swimming"
- 01/2016 **Modeling, Adaptive Discretizations and Solvers for FSI**, RICAM, Austria: "Multiresolution simulations of optimal self-propelled swimmers in 2D and 3D"
- 05/2015 **JFI Theory Seminar**, University of Chicago, USA: "Vortex Rings, Tubes and Pairs"
- 11/2014 **Fluid-Structure Interaction Workshop**, Grenoble, France: "Multiresolution simulations of self-propelled swimmers using a remeshed vortex method"
- 02/2014 **Thermofluids seminar**, UCLA, USA: "Simulations and optimizations of self-propelled swimmers"
- 10/2013 **Frontiers in Energy Research (ESC)**, ETH Zurich, Switzerland: "Flow simulations for optimal fish-like propulsion"
- 10/2009 **GALCIT Fluid Mechanics seminar**, Caltech, USA: "Simulations of viscous vortex rings using vortex methods"

Conference Presentations

- 03/2019 **APS-March Meeting**, Boston, MA, USA: "Mechanics and inverse-design of thin shape-shifting structures"
- 11/2018 **Soft Green Materials Workshop**, Boston, MA, USA: "Mechanics and inverse-design of thin shapeshifting structures"
- 11/2018 **APS-DFD**, Atlanta, GA, USA: "Energy harvesting with a rotating cylinder pair in a free-stream flow"
- 06/2018 **New England Complex Fluids**, Boston, USA: "Simulation and design of thin shape-shifting structures "
- 07/2017 **SES**, Boston, USA: "Inverse Design of Growth Patterns for Shape-Shifting Bilayers"

- 11/2016 **APS-DFD**, Portland, OR, USA: "Simulating wave-turbulence on thin elastic plates with arbitrary boundary conditions"
- 11/2015 **APS-DFD**, Boston, USA: "Self-propulsion of a rotating cylinder pair"
- 09/2013 **ParCo**, Munich, Germany: "High Performance CPU/GPU multiresolution Poisson solver"
- 09/2013 **Particles**, Stuttgart, Germany: "Multiresolution simulations using remeshed particles"
- 08/2012 **ICTAM**, Beijing, China: "Shape and motion optimization of 3D self-propelled swimmers"
- 05/2012 **SPHERIC Workshop**, Prato, Italy: "Remeshed Particles: a robust and efficient method for multiphysics simulations"
- 11/2011 **APS-DFD**, Baltimore, USA: "Cascade of vortex tube collisions at $Re_{\tau} = 10\,000$ "

Teaching

- S/2020 Thin Plates and Shells (MIT): Lecturer
- S/2019 Thin Plates and Shells (MIT): Lecturer
- F/2018 Thermal-Fluids Engineering I (MIT): Lecturer
- S/2018 Thin Plates and Shells (MIT): Lecturer
- S/2014 Computational Engineering (ETH Zurich): Teaching assistant
- S/2013 Computational Engineering (ETH Zurich): Teaching assistant
- F/2012 HPC for Science and Engineering (ETH Zurich): Teaching assistant
- F/2011 Multiscale Modelling and Computations (ETH Zurich): Head teaching assistant
- F/2010 Multiscale Modelling and Computations (ETH Zurich): Head teaching assistant
- S/2010 Simulations using Particles (ETH Zurich): Teaching assistant
- S/2009 Advanced Computational Science (ETH Zurich): Teaching assistant

Supervised students

- 08/2018 - now James Gabbard (MSc, MIT): "An Immersed Interface Method for Incompressible Flow with Moving Boundaries and High Order Time Integration "
- 08/2018 - now Lingbo Ji (PhD, MIT): "Self-propulsion of a rotation cylinder pair in a viscous fluid"
- 01/2014 - 07/2014 Guide Novati (MSc, Delft University of Technology / ETH Zurich): "Bio-inspired locomotion of a rotating cylinder pair"
- 04/2014 - 09/2014 Laurent Montigny (MSc, École Polytechnique / ETH Zurich): "Parallel learning for self-propelled swimmers"

01/2014 - 07/2014 Guide Novati (MSc, Delft University of Technology / ETH Zurich): "Bio-inspired locomotion of a rotating cylinder pair"

Last updated: June 24, 2020