Asim Önder, Ph.D.

Personal

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Research Interests

Coastal and Marine Processes ▷ oceanic boundary layers ○ air-sea interactions ○ breaking waves ○ wave-current interactions ○ tsunamis
Offshore Wind Energy ▷ aerodynamics of floating wind turbines ○ metocean characterization ○ wind-farm design and control
Computational Science ▷ volume of fluid method ○ data assimilation ○ machine learning ○ adaptive methods ○ high-order methods

Education

Ph.D., Mechanical Engineering — **Dec 2014**
KU Leuven — Leuven, Belgium
M.Sc., Computational Science and Engineering — **May 2009**
Technical University of Munich — Munich, Germany
B.Sc., Mechanical Engineering — **Jun 2006**
Istanbul Technical University — Istanbul, Turkey

Professional Experience

Assistant Professor — **Aug 2022 – Present**
National Sun Yat-sen University — Kaohsiung, Taiwan
Department of Marine Environment and Engineering

Senior Research Fellow — **Jan 2022 – July 2022**
National University of Singapore — Singapore
Department of Civil and Environmental Engineering

Research Fellow — **Oct 2015 – Dec 2021**
National University of Singapore — Singapore
Department of Civil and Environmental Engineering

Postdoctoral Researcher — **Jan 2015 – Oct 2015**
KU Leuven — Leuven, Belgium
Department of Mechanical Engineering

Research Grants

(Currencies ▷ NT$: New Taiwan Dollar)

1. Air-sea interactions in marine surface layers: a fully-coupled approach, NSTC, Taiwan
   Role: PI
   Period: 01.03.2023–29.02.2024
   Resources: 800.000 NT$

2. Simulation of Air-Sea Interactions with AI-Accelerated Computational Fluid Dynamics, NSCC, Singapore & Riken, Japan
   Role: Project representative

Period: 01.04.2022–31.03.2023
Resources: 315,634 node hours on Fugaku supercomputer (Japan)

PUBLICATIONS

Peer-Reviewed Journal Articles (Corresponding author*)

1. Goit, J. P., & **Önder, A.** (2023). The effect of wind turbine sitting on the power output and flow fields of offshore wind farms. *Journal of Wind Energy,JWEA*. 47:2, 29-35. doi: https://doi.org/10.11333/jwearonbun.47.2_29 (**pdf**)
2. **Önder, A.***, & Liu, P. L.-F. (2023). Deep learning of interfacial normal and curvature: a symmetry-preserving approach for the volume of fluid method. *Journal of Computational Physics*. 485, 112110. doi: http://dx.doi.org/10.1016/j.jcp.2023.112110 (**pdf**)
3. Goit, J. P., & **Önder, A.** (2022). The effect of coastal terrain on nearshore offshore wind farms: a large-eddy simulation study. *Journal of Renewable and Sustainable Energy*. 14(4):043304. doi: http://dx.doi.org/10.1063/5.0094476
4. **Önder, A.***, & Liu, P. L.-F. (2021). Receptivity and transition in a solitary wave boundary layer over rough bottom topography. *Journal of Fluid Mechanics.* 912, A21. doi: http://dx.doi.org/10.1017/jfm.2020.1141
5. **Önder, A.***, & Liu, P. L.-F. (2020). Stability of the solitary wave boundary layer subject to finite-amplitude disturbances. *Journal of Fluid Mechanics.* 896, A20. doi: http://dx.doi.org/10.1017/jfm.2020.351 (**pdf**)
6. **Önder, A.***, & Yuan J. (2019). Turbulent dynamics of sinusoidal oscillatory flow over a wavy bottom. *Journal of Fluid Mechanics.* 858, 264-314. doi: http://dx.doi.org/10.1017/jfm.2018.754
7. **Önder, A.***, & Meyers, J. (2018). On the interaction of very-large-scale motions in a neutral atmospheric boundary layer with a row of wind turbines. *Journal of Fluid Mechanics.* 841, 1040-1072. doi: http://dx.doi.org/10.1017/jfm.2018.86
8. **Önder, A.**, & Meyers, J. (2016). Optimal control of a transitional jet using a continuous adjoint method. *Computers and Fluids*. 126, 12–24. doi: http://dx.doi.org/10.1016/j.compfluid.2015.11.012
9. **Önder, A.**, & Meyers, J. (2014). Modification of vortex dynamics and transport properties of transitional axisymmetric jets using zero-net-mass-flux actuation. *Physics of Fluids* 26 (7), 075103. doi: http://dx.doi.org/10.1063/1.4890242

Theses

1. **A. Önder** (2014). Active control of turbulent axisymmetric jets using zero-net-mass-flux actuation. *Ph.D. Dissertation.* (**pdf**)
2. **A. Önder** (2009). Projection methods using finite elements in fluid mechanics. *Master Thesis.* (**pdf**)

Newsletter

1. **A. Önder** (2016). Direct numerical Simulation of oscillatory flow over rippled bed using Fourier-spectral/hp element discretization, HPC@NUS Newsletter. (**url**)

Talks and seminars

Conferences

1. **Önder, A.** & Liu, P. L.-F. (2023) Turbulence-resolving simulations of bottom boundary layers under tsunamis, *AOGS2023: 20th Annual Meeting of Asia Oceania Geosciences Society*, Singapore
2. **Önder, A.**, & Liu, P. L.-F. (2021). A machine learning approach for the simulation of water waves using volume of fluid method, *43rd Ocean Engineering Conference*, Taoyuan City, Taiwan. (**pdf**)
3. **Önder, A.**, Liu, P. L.-F., & Tsai W. T. (2020) Generation and breakdown of surface streaks in wind-driven aqueous flow, *22nd Australasian Fluid Mechanics Conference*, Brisbane, Australia (Accepted but withdrawn due to Covid-19). (**pdf**)
4. Goit J. P., & **Önder A.** (2020) Large-eddy simulation of nearshore offshore wind farms, *22nd Australasian Fluid Mechanics Conference*, Brisbane, Australia. (**pdf**)
5. **Önder, A.**, & Liu, P. L.-F. (2019). Emergence of streaks and turbulent spots in an unsteady boundary layer beneath a solitary wave, 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, WA, USA
6. Goit, J.P., **A. Önder** (2019). A simulation framework for upscaling of wind turbine designs, 41st Wind Energy Symposium by Japan Wind Energy Association, Tokyo, Japan
7. **Önder, A.**, & Meyers, J. (2017). On very-large-scale motions (VLSMs) and long-wavelength patterns in turbine wakes, 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO, USA
8. **Önder, A.**, & Meyers, J. (2014). Optimal control of turbulent jets using an unsteady adjoint solver, 6th European Conference on Computational Fluid Dynamics (ECFD VI). Barcelona, Spain.
9. **Önder, A.**, & Meyers, J. (2013). HPC realization of a controlled turbulent jet using OpenFOAM, *Open Source CFD International Conference 2013*. Hamburg, Germany. (**pdf**)
10. **Önder, A.**, Wu, P., & Meyers, J. (2012) Improving speed-up and efficiency in simulation of stationary turbulent flows by parallelization of statistical averaging, *9th International ERCOFTAC Symposium on Engineering Turbulence Modeling and Measurements*. Thessaloniki, Greece. (**pdf**)
11. **Önder, A.**, & Meyers, J. (2012). DNS study of the active control of an axisymmetric jet with zero-net mass-flux (ZNMF) actuators, *the 9th European Fluid Mechanics Conference (EFMC9)*. Rome, Italy.

Invited Talks

1. On bottom drag and turbulence under tsunami-like long waves. *National Cheng Kung University*, Tainan, Taiwan, Jan 2023.
2. Can tsunamis generate turbulence in deep waters? *44th Ocean Engineering Conference*, Kaohsiung, Taiwan, Nov 2022.
3. Turbulent boundary layers beneath tsunami-scale long waves. *The 1st Taiwan Society of Fluid Dynamics Conference*, Hsinchu, Taiwan, Oct 2022.

4. Towards fully resolving the turbulence around wave-induced bedforms using petascale supercomputing, *Supercomputing Frontiers 2017*, Singapore, Mar 2017

Teaching Experience

MAEV240: Engineering Mechanics
NSYSU, Dept. Marine Environment and Engineering
Level: Undergraduate
Type: Required
Description: Fundamentals of statics

MAEV204: Engineering Mathematics II
NSYSU, Dept. Marine Environment and Engineering
Level: Undergraduate
Type: Required
Description: Vector calculus, Fourier analysis

MAEV522: Marine System Modelling I
NSYSU, Dept. Marine Environment and Engineering
Level: Graduate
Type: Elective
Description: Introductory course to computational modelling of flows in the marine environment

MAEV525: Applied Engineering Hydraulics
NSYSU, Dept. Marine Environment and Engineering
Level: Graduate
Type: Elective
Description: Fundamental principles of hydraulics, and the design of some basic flow systems

Affiliations and Services

Reviewer
Journal of Fluid Mechanics, Journal of Computational Physics, Journal of Geophysical Research: Solid Earth, Energies

Member
American Physical Society, American Geophysical Union, European Geophysical Union

Awards

New Faculty Award **Aug 2022**
National Sun Yat-sen University