Asim Önder (歐雅森), Ph.D.

Assistant Professor, Department of Marine Environment and Engineering
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Research Profile

I am an engineer and computational scientist with a focus on complex multiphase and turbulent flows. My research combines high-accuracy numerical algorithms, theoretical analysis, and data-driven modeling to tackle fundamental problems in air-sea exchange, wave dynamics, and flow-structure interaction. I strive to bridge the gap between first-principles and engineering design in support of offshore renewable energy, coastal resilience, and ocean systems.

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

Affiliated Appointments

Affiliated Researcher — May 2025 – May 2026
Texas A&M University, *College Station, TX, USA*
Department of Civil & Environmental Engineering

Formal appointment providing access to university High-Performance Computing (HPC) resources for collaborative research on air-sea interaction in coastal regions.

Faculty Sponsors: Prof. Philip L.-F. Liu & Prof. Kuang-An Chang.

Research Grants as Principal Investigator

- **Exchange Processes in Marine Surface Layers: A Fully-Coupled Approach (II)**
  Agency: National Science and Technology Council (NSTC), Taiwan
  Period: Aug 2024 – Jul 2027   *Amount:* 3,322,000 NT$ (approx. €96,000 EUR)

- **Air-Sea Interactions in Marine Surface Layers: A Fully-Coupled Approach**
  Agency: NSTC, Taiwan
  Period: Mar 2022 – Jul 2024   *Amount:* 800,000 NT$ (approx. €23,000 EUR)

- **Simulation of Air-Sea Interactions with AI-Accelerated CFD**
  Agencies: NSCC Singapore & Riken Japan
  Grant: 315,654 node hours on the Fugaku supercomputer.
  Period: Apr 2022 – Mar 2023
  Note: This competitive international grant provided access to Fugaku, ranked among the world's top supercomputers.

Selected Peer-Reviewed Publications

1. **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]

2. **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]

3. **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]

4. **Önder, A.**, & Yuan J. (2019). Turbulent dynamics of sinusoidal oscillatory flow over a wavy bottom. *Journal of Fluid Mechanics*. 858, 264-314. [DOI]

5. **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]

   A complete publication list is available at my Google Scholar profile.

Invited Talks

- "High-Fidelity Two-Phase Flow Simulation of Turbulent Air–Sea Exchange using Sharp Interface Methods." ***Keynote Speech***, *30th National Computational Fluid Dynamics Conference*, Tainan, Taiwan, Aug 2025.

- "Microscale Multiphase Dynamics at the Air–Sea Interface." *Invited Seminar, Institute of Oceanography, National Taiwan University*, Taipei, Taiwan, Scheduled Fall 2025.

- "Neural-Network Models for Curvature Estimation in Two-Phase Interfacial Flows." *Taiwan Society for Industrial and Applied Mathematics Annual Meeting*, Taichung, Taiwan, May 2024.

- "High-Fidelity Simulations of Oceanic Flows: Tsunamis, Turbulence and Machine Learning." *Invited Seminar, Institute of Hydrological and Oceanic Sciences, National Central University*, Taoyuan, Taiwan, Dec 2023.

- "Resolving Tsunami Turbulence: Scientific and Computational Challenges." *State Grid HPC/AI User Achievements Exchange Conference*, Tainan, Taiwan, Dec 2023.

- "On Bottom Drag and Turbulence Under Tsunami-Like Long Waves." *Invited Seminar, Department of Hydraulic and Ocean Engineering, National Cheng Kung University*, Tainan, Taiwan, Jan 2023.

- "Turbulent Boundary Layers Beneath Tsunami-Scale Long Waves." *1st Taiwan Society of Fluid Dynamics Conference*, Hsinchu, Taiwan, Dec 2022.

- "Can Tsunamis Generate Turbulence in Deep Waters?" *44th Ocean Engineering Conference*, Kaohsiung, Taiwan, Nov 2022.

- "Towards Fully Resolving the Turbulence Around Wave-Induced Bedforms Using Petascale Supercomputing." *Supercomputing Frontiers 2017*, Singapore, Mar 2017.

Teaching Experience

Instructor of Record, National Sun Yat-sen University   2022 – Present

- MAEV204: Engineering Mathematics II (Undergraduate, Required, 3 offerings)

- MAEV522: Marine System Modelling I (Graduate, Elective, 3 offerings)

- MAEV525: Applied Engineering Hydraulics (Graduate, Elective, 3 offerings)

- MAEV628: Turbulence (Graduate, Elective, 2 offerings)

- MAEV240: Engineering Mechanics (Undergraduate, Required, 1 offering)

- MAEV504: Seminar in Marine Environment (Graduate, Required, 1 offering)

Awards and Honors

- **New Faculty Award**, National Sun Yat-sen University   Aug 2024
  (Awarded for the 113 Academic Year)

- **Excellent Teaching Course Award (Engineering Mathematics II)**   Spring 2024
  (Awarded for the 112-2 Academic Semester)

- **New Faculty Award**, National Sun Yat-sen University   Aug 2022
  (Awarded for the 111 Academic Year)

- **Excellent Teaching Course Award (Engineering Mechanics)**   Spring 2023
  (Awarded for the 111-2 Academic Semester)

Professional Service

Peer Reviewer for *Journal of Fluid Mechanics, Journal of Computational Physics, Journal of Geophysical Research, International Journal of Multiphase Flow*

Professional Memberships include the American Physical Society (APS) and the European Geosciences Union (EGU).