ANDREAS MENTZELOPOULOS

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EDUCATION

Massachusetts Institute of Technology (MIT) *2020 – pres. (2025)*
PhD Mechanical Engineering and Computation (pursuing) .
SM Computer Science (pursuing) *2022 – pres.*
SM Mechanical Engineering *2020 – 2022*
GPA: 4.9 / 5.0

University of Michigan - Ann Arbor *2016 – 2020*
BSE Mechanical Engineering (minor in Mathematics)
BSE Naval Architecture & Marine Engineering
GPA: 3.86 / 4.00

RESEARCH INTERESTS

Deep Learning, Generative Modelling, Time-series Forecasting, ML in finance.

RELEVANT COURSEWORK (MIT)

Machine Learning*:* Machine Learning (6.7900), Deep Learning (6.S898), Parallel Computing & Scientific Machine Learning (6.7320), Computer Vision (6.8301), Nonlinear Optimization (6.7220), Intro to Machine Learning (6.036).
Mathematics: Numerical Methods for Partial Differential Equations (6.7330), Stochastic Systems (2.122), Numerical Fluid Mechanics (2.29), Dynamics (2.032), Marine Hydrodynamics (2.20).
Finance: Advanced Data Analytics and Machine Learning in Finance (15.S08), Financial Markets (15.433), Managerial Finance (15.041).

RESEARCH EXPERIENCE

Towing Tank & Stochastic Analysis and Nonlinear Dynamics Lab, MIT *09/2020 – pres.*
Graduate Student Research Assistant, PI: Prof. Michael Triantafyllou, Prof. Themis Sapsis

1. **Time-series forecasting using deep-learning**: I am developing digital twins for risers – long, flexible underwater pipelines – vibrating constantly under the excitation of stochastic hydrodynamic loads. Given sparse noisy measurements, I am leveraging transformers (and other DL architectures) to model and continuously forecast the vibrations (nonlinear, nonstationary dynamics) in real time.

2. **Generative modeling for multivariate time-series**: I am leveraging generative-AI algorithms to synthesize instances of multivariate VIV time-series using Wasserstein GANs (wGANs), Variational Autoencoders (VAEs), and Denoising-Diffusion probabilistic models (DDPMs).

3. **Generative modeling for high-resolution image synthesis**: I am leading LOBSTgER (Learning Oceanic Bioecological Systems Through gEnerative Representations), an effort dedicated to generating ultra-realistic high-resolution underwater images leveraging latent diffusion models.

SELECTED PUBLICATIONS (for full list reference google scholar)

1. **Mentzelopoulos, A.,** Fan, D., Sapsis, T., Triantafyllou, MS, "Variational autoencoders and transformers for multivariate time-series generative modeling and forecasting: Applications to vortex-induced vibrations". Ocean Engineering, 2024
2. **Mentzelopoulos, A.,** Prele, E., Fan, D., del Aguila Ferrandis, J., Sapsis, T., Triantafyllou, MS, "Reconstructing Flexible Body Vortex-Induced Vibrations Using Machine-Vision and Predicting the Motions Using Semi-Empirical Models Informed with Transfer Learned Hydrodynamic Coefficients". Journal of Fluids and Structures, 2024
3. **Mentzelopoulos, A.** Ferrandis, J.d.A., Rudy, S., Sapsis, T., Triantafyllou, M.S, Fan, D., "Data driven prediction and study of vortex induced vibrations by leveraging hydrodynamic coefficient databases learned from sparse sensors", Ocean Engineering, 2022.

WORK EXPERIENCE

CITIC Securities CLSA, Intern *06 – 08/2024*

Interned for Quantitative Trading Strategies, at the New York, NY office. Worked on quantitative trading research and development.

1. Market neutral statistical arbitrage strategies using deep learning.
2. Model back-testing across various geographical locations including the US and Southeast Asia.
3. Trading software development and optimization.

MathWorks, Intern *06 – 08/2023*

Interned for the Engineering Development Group, at the Natick, MA office. Worked on quality engineering of the simscape multibody and simscape fluids products.

1. Test suite development for the Gas, Moist Air, and Isothermal Liquid libraries.
2. Design and deployment of hydraulic and control components for the customer-facing forklift example (2024a).
3. Test suites for 10 simscape example models.

American Bureau of Shipping, Intern *06 – 08/2020*

Worked for the Engineering Services Department, Offshore Equipment Group, at the Houston, Texas office.

1. Full engineering reviews for pressure vessel designs as per ASME Section VIII Div. 1.
2. Classification of BP's Mad Dog phase 2 – Argos semi-submersible (reviewed 340+ drawings).
3. Allowable chemical cargo lists for 12 chemical tankers according the IBC Code effective January 2021.
4. Client correspondence.

HONORS & AWARDS

Onassis Foundation Scholarship, Onassis Foundation	*12/2022*
MathWorks Fellowship, MathWorks	*09/2022*
Society of Naval Architecture and Marine Engineering Award, Massachusetts Institute of Technology	*05/2021*
William M. Kennedy Scholarship, Society of Naval Architects & Marine Engineers	*04/2021*
MIT SMA2 Fellowship, Massachusetts Institute of Technology	*09/2020*
James B. Angell Scholar, University of Michigan	*04/2020*
Undergraduate Scholarship, Society of Naval Architects & Marine Engineers	*07/2019*
NA&ME Department Scholarship, University of Michigan	*06/2019*
Merit NA&ME Fellowship, University of Michigan	*01/2019*
ABS Scholarship, American Bureau of Shipping	*05/2018*
University Honors, University of Michigan	*2016-2020*
Dean's List, University of Michigan	*2016-2020*

SKILLS

Computer languages	Python (PyTorch), MATLAB, C++, Julia
Languages	Greek (native), English (fluent), German (Goethe-Zertifikat B1)