José del Águila Ferrandis

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Education

- **Massachusetts Institute of Technology** — Cambridge MA, USA
  Doctor of Philosophy - Computational Engineering MIT-CCE — *2018-2024*
  Selected Courses: *6.687 - Machine Learning, 18.036 - Fast Methods for Partial Differential Equations, 2.111 - Quantum Computing.*
- **ETSIN - UPM** — Madrid, Spain
  Bachelor & Master of Science - Ocean Engineering — *2012-2018*

Skills Summary

- **Languages**: Python, Bash Scripting, C++, CUDA, Matlab, MySQL, LaTeX.
- **Frameworks**: Starccm+, Abaqus, OpenFoam, ANSYS, TensorFlow, PyTorch, Keras, Docker, GIT.
- **Platforms**: Linux, Web, Windows, Raspberry.

Relevant Experiences

- **MIT Sea Grant–Design Lab** — 12 Emily St, MA 02139
  Research Assistant — *September 2018 - Present*
  - **Physics Informed Neural Networks**: Developed techniques to embed physical laws in artificial neural networks parametrizing solutions of partial differential equations, such as Navier-Stokes.
  - **Nonlinear dynamics**: Applied machine learning to model ship motions, optimizing computations for vessel integrity assessments in adverse weather. Explored predictive capabilities for varying ship motion probability distributions based on sea conditions.
- **NVIDIA** — 2788 San Tomas Expressway Santa Clara, CA 95051
  Application Engineering & Development Researcher — *March 2020 - August 2020*
  - **Physics Informed Neural Networks**: Implemented mass conservation schemes for incompressible flows, significantly improving model predictions. Implemented several turbulence models and studied their convergence properties.

Other Experiences

- **Chevron** — 1400 Smith Street Houston, TX
  Naval Architect Intern — *June 2022 - August 2022*
  - **Global Performance Analysis**: Improved the robustness of the in-house software analysis orchestrator tool GRAMPA. Created a framework to simulate random sea states with flexible boundary conditions. The resulting virtual towing tank was not restricted to specific sea state formulations and was capable of analyzing 3h storms with DES simulations.
- **MIT Sea Grant–Design Lab** — 12 Emily St, MA 02139
  Visiting Student — *July 2017 - December 2017*
  - **Multi-Physics and CAD Modelling**: ESRDC, parametric CAD modeling and network optimization. Design Lab: Development of a Beam Theory numerical code and scripting process for parametric analysis.

Honors and Awards

- **"la Caixa" Fellowship** — *June 2017*
  "la Caixa" Foundation – Fellowship to extend studies in the United States
- **Fulbright Fellowship** — *September 2017*
  Fulbright Foundation – Fellowship to extend studies in the United States - (renounced)

Volunteer Experience

- **President at Spain@MIT** — September 2021 - Present
  Organize regular social and cultural events in addition to industry-oriented presentations.

Selected Publications

- **Journal Paper**: José del Águila Ferrandis, Michael S Triantafyllou, Chryssostomos Chryssostomidis, and George Em Karniadakis. Learning functionals via LSTM neural networks for predicting vessel dynamics in extreme sea states. *Proceedings of the Royal Society A*, 477(2245):20190897, 2021
- **Journal Paper**: Luca Bonfiglio, Paris Perdikaris, Jose del Águila, and George E Karniadakis. **A probabilistic framework for multidisciplinary design: Application to the hydrostructural optimization of supercavitating hydrofoils**. *International Journal for Numerical Methods in Engineering*, 116(4):246–269, 2018
- **Preprint**: Oliver Hennigh, Susheela Narasimhan, Mohammad Amin Nabian, Akshay Subramaniam, Kaustubh Tangsali, Max Rietmann, Jose del Aguila Ferrandis, Wonmin Byeon, Zhiwei Fang, and Sanjay Choudhry. **NVIDIA SimNetˆ{TM}: an AI-accelerated multi-physics simulation framework**. *arXiv preprint arXiv:2012.07938*, 2020
- **Journal Paper**: Xuhui Meng, Liu Yang, Zhiping Mao, José del Águila Ferrandis, and George Em Karniadakis. **Learning functional priors and posteriors from data and physics**. *Journal of Computational Physics*, 457:111073, 2022