



Research Associate Professor

Raju Datla

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Subject: Visiting Research Scholar Appointment – Phase II

Dr. Ruben J. Paredes
Escuela Superior Politécnica del Litoral (ESPOL)
Km 30.5 Vía Perimetral, Ofic. 60-212
Guayaquil – Ecuador

Dear Dr. Paredes:

Stevens Institute of Technology is pleased to extend your appointment as a Visiting Research Scholar in the Department of Civil, Environmental, and Ocean Engineering (CEOE). This second-phase effort will take place from April 15th, 2025, through August 31st, 2026. Please note that this is a research position and not a faculty appointment.

Phase I Achievements

During the past six months of collaboration, your contributions to experimental testing and numerical simulations in Wave Energy Converters, marine turbines, and machine learning applications for resistance estimation have led to several significant research outputs:

Conference papers:

- a) "Performance Assessment of Warped Bottom Planing Hulls Using Machine Learning Techniques" – Published in the Proceedings of the SNAME Power Boat Symposium 2024.
- b) "Experimental Performance Assessment of a Crossflow Turbine for Energy Generation from Moving Water" – Accepted for oral presentation at the Turbomachinery Technical GT 2025 Conference.
- c) "Experimental Assessment of a Roll-Based Wave Energy Converter" – Accepted for oral presentation at the 44th International Conference on Ocean, Offshore, and Arctic Engineering (OMAE 2025).
- d) "Numerical Performance Assessment of a Crossflow Turbine for Energy Generation from Slow-Moving Water" – Accepted for the 16th European Wave and Tidal Energy (EWTEC 2025) Conference.



- e) “Vertical accelerations and added-resistance predictions using machine learning for planing hulls” – Submitted to International Conference on Fast Sea Technology (FAST 2025) conference.
- f) "Modeling the Hydrodynamic Response of a Roll-Based Wave Energy Converter" – Submitted to the IUTAM Symposium on Nonlinear Dynamics of Systems and Structures for Green Energy Generation.

Research Proposals & Journal publications:

- a) Proposal: "Experimental Performance Assessment of a Novel Roll-Based WEC with Passive Tuning for Tropical Regions (ADWEC)" – Submitted to the TEAMER program, funded by the Department of Energy (DOE).
- b) Manuscript: "Experimental Proof-of-Concept of Roll-Based Wave Energy Converter with Passive Tuning" – Under preparation for submission to the Ocean Engineering Journal.

Objectives for Phase II

Building upon the progress of Phase I, this second phase will deepen and expand our research on the novel roll-based Wave Energy Converter (WEC) being develop for tropical regions. The primary goals for this phase include:

- Developing a Reduced-Order Model using Physics-Informed Neural Networks (PINN) to enhance predictive capabilities.
- Expanding the Hydrodynamic Model by incorporating coupled roll, heave, and pitch motions for a more comprehensive analysis.
- Integrating Power Take-Off (PTO) Effects into the system dynamics to evaluate energy extraction performance.

To achieve these objectives, this phase will require extensive additional experimental work and numerical simulations, leveraging:

- The high-speed towing tank at the Davidson Lab for advanced hydrodynamic testing.
- The institutional High-Performance Computing (HPC) server for large-scale numerical simulations.
- High-impact journal publications to disseminate findings and advance the field.

Roles & Responsibilities

As a Visiting Research Scholar, your responsibilities during this second phase will include: • Conducting computational hydrodynamics research, with applications in green ship technologies and wave/tidal energy harvesting.



- Collaborating with graduate students and postdoctoral researchers, leading to high-impact journal publications.
- Working alongside faculty members on new and ongoing collaborative research proposals.
- Strengthening and formalizing academic collaborations between Stevens Institute of Technology and ESPOL.

Financial Support & Administrative Assistance

You will continue to receive a monthly supplemental fund through the department. Additionally, the Department of Civil, Environmental, and Ocean Engineering and International Scholar Services will assist you with the necessary administrative and visa-related documentation.

We look forward to the continued success of this collaboration and the impactful contributions you will make during this next phase.

Sincerely,

Raju Datla, PhD
Research Associate Professor
Charles V. Schaefer, Jr. School of Engineering and Science
Department of Civil, Environmental and Ocean Engineering