



Politecnico
di Torino

DIMEAS SEMINAR

CONTROL CO-DESIGN FOR WAVE ENERGY CONVERSION



SPEAKER



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Electronic Engineering
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11:30–13:30**



**SALA FERRARI, II floor, DIMEAS
Politecnico di Torino**

PROGRAM

Abstract

It has been established that there is a strong relationship between various aspects of wave energy system optimization and the energy-maximising controller employed. Control co-design (CCD) focusses on such relationships and attempts to provide an overriding design philosophy to the simultaneous (or co-design) of physical system attributes and control system. In wave energy systems, optimization of a range of physical characteristics has been addressed, including hull geometry, array layout, power take-off parameters, and moorings. In some cases, multiple aspects have been addressed.

This seminar attempts to provide an overview of the general CCD philosophy, while showing some typical CCD examples within the wave energy application. Given that CCD application in wave energy systems can be computationally demanding, some attention is paid to the appropriate use of mathematical models and control design/evaluation, along with some examination of appropriate CCD performance objectives.

Biography

John V. Ringwood received the Diploma degree in electrical engineering from Technological University, Dublin, Ireland, in 1981, and the Ph.D. degree in control systems from Strathclyde University, Glasgow, U.K., in 1985. He was with the School of Electronic Engineering, Dublin City University, Dublin, from 1985 to 2000 and has held visiting positions at Massey University, Auckland, New Zealand, and The University of Auckland. He was the Founding Head of the Department of Electronic Engineering, Maynooth University, Ireland, where he served as the Dean of Engineering, from 2001 to 2006, and is currently Chair Professor of Electronic Engineering and the Director of the Centre for Ocean Energy Research. He has coauthored the monograph Hydrodynamic Control of Wave Energy Devices (with Umesh Korde). His research interests focus on control systems and their applications, including renewable energy systems (and wave energy in particular), physiology, and exercise physiology. John was a co-recipient of the 2016 IEEE Control Systems Outstanding Paper Award and the 2023 IEEE Transactions on Control Systems Technology Outstanding Paper Award. He is Associate Editor of IEEE Transactions on Sustainable Energy, the Journal of Ocean Engineering and Marine Energy, and IET Renewable Power Generation. He is a Chartered Engineer and a Fellow of Engineers Ireland. He has received a number of awards, including the 2013 Commercialisation Award, the 2019 Doctoral Supervision Award, and the 2024 Outstanding Researcher Award, all from Maynooth University, as well as the 2008 Commercialisation Award from Enterprise Ireland. He was elevated to Chevalier des Palmes Academiques by the French Government, for contributions to ocean energy and collaboration with French researchers in 2017, and IEEE Fellow in 2024, for contributions to wave energy control systems.