



PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 39th cycle

Research Area n. 3 - Environmental and Hydraulic Engineering and Geomatics

PNRR 117 Research Field: MARINE ENERGY EXPLOITATION IN THE MEDITERRANEAN
SEA

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

To date, no technology has become established in the marine renewable energy market and few have reached the prototype stage in a real environment. On the other hand, many research projects are focused on this topic because of the importance that the potential exploitation of marine energy could represent.

In recent years, the FluidLab research group (fluidlab.polimi.it) has been investigating the possible application of a near-shore WEC.

The idea of this PhD project is to develop an improved version of this innovative WEC, with the aim of increasing and evaluating its performance through numerical and experimental approaches, and possibly reaching an advanced design phase leading to the evaluation of a first installation of a prototype in a real environment.

The main research objectives are:

- The technical and scientific review of technologies for the exploitation of marine energy in the Mediterranean Sea;
- The development and verification of technological solutions to improve the energy efficiency of the WEC;
- The numerical evaluation (CFD) of the potential fluid dynamic evolution of the WEC (e.g. dynamic damping; shape; ...);



	<p>shape; ...);</p> <ul style="list-style-type: none"> - The upgrading of the experimental equipment available at the Hydraulic Laboratory of the Politecnico di Milano, in order to improve the effectiveness of the tests; - The numerical evaluation of the fluid dynamic response of the WEC to real wave conditions; - The first design of the full-scale prototype.
Methods and techniques that will be developed and used to carry out the research	<ul style="list-style-type: none"> - Advanced CFD fluid-structure interaction models; - Similarity and modelling approach for experimental design and testing of the WEC scale model; - Study and development of possible energy conversion system.
Educational objectives	<p>Learn about best practices and innovative technologies in Wave Energy converters. Learn how to experimentally evaluate the performances of hydraulic devices dedicated to marine energy recovery. Gain experience in the application of state of the art methodologies and AI in all the aspects related to the marine energy.</p> <p>Prepare highly qualified professionals to efficiently tackle engineering scenarios linked to marine energy recovery management. Close collaboration between PoliMI and the industrial partner yields a unique opportunity for the PhD to be trained in diverse aspects contributing to shape their future careers, including economic-management and goals oriented to sustainable use of energy resources.</p>
Job opportunities	Expert in WEC efficiency, asset management and optimization of operations. Energy manager.
Composition of the research group	1 Full Professors 1 Associated Professors 2 Assistant Professors 4 PhD Students
Name of the research directors	Stefano Malavasi

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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	A2A S.p.A
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	To be defined
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research:

- A2A
- XC-Engineering
- Politecnico di Bari

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): approximately 1630,00 euros per PhD candidate per year, on average.

Teaching assistantship (availability of funding in recognition of support to teaching activities by the PhD student): there are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability and desk availability: individual assignment for the entire career.