



# PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 38th cycle

**PARTENARIATO PNRR Research Field: MULTI-SCALE COMPUTATIONAL TECHNIQUES FOR FLOATING OFFSHORE WIND TURBINE SIMULATIONS**

**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

<b>Motivation and objectives of the research in this field</b>	<p><b>CUP D43C22003090001</b>  <b>Decreto di Concessione D.D. 1561 del 11/10/2022</b></p> <p>The aim of the study is to investigate computationally the flow around floating off-shore wind turbines, considering both horizontal-axis and vertical-axis rotors, in view of improving their performance in both isolated and wind farm operation.</p> <p>Multiple physical models will be considered, featuring different levels of approximation, fidelity level, and computational cost.</p> <p>The study will first consider surge and pitch motions applied to an horizontal-axis wind turbine, so to construct simplified wake models to be used for the definition of advanced/holistic wind farm control.</p> <p>The second part of the study will focus on a novel vertical-axis wind turbine configuration, operating in floating tilted mode, to assess its performance and its enhanced wake recovery.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The research program will require the use of the following computational tools:</p> <p>OpenFAST, for engineering simulations of horizontal-axis rotors.</p> <p>OpenFOAM CFD tool, for the intermediate-fidelity simulation of horizontal-axial wind turbines.</p>



	ANSYS-Fluent, for high-fidelity/fully-resolved CFD simulations of the flow around turbine rotors.
<b>Educational objectives</b>	To provide a high level knowledge about advanced fluid dynamics concepts applied to wind turbine optimization, analysis, and control. Up-to-date skills for wind turbine modeling.
<b>Job opportunities</b>	National and international companies in the field of wind turbine design, installation, and operation. Consultancy companies. Private and public research centers.
<b>Composition of the research group</b>	2 Full Professors 2 Associated Professors 1 Assistant Professors 5 PhD Students
<b>Name of the research directors</b>	Giacomo Bruno Azzurro Persico; Vincenzo Dossena

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

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	700.0 €
<b>By number of months</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
<p><b>Educational activities:</b> Financial aid per PhD student is available for purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. This amount is equal to 10% of the annual gross amount, for 3 years.</p> <p><b>Teaching assistantship:</b> Availability of funding in recognition of supporting 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</p>



by the regulations.

Computer availability: individual use.

Desk availability: individual use.