POLITECNICO DI MILANO

PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

PNRR 117 Research Field: WIND FARM OPTIMAL CONFIGURATION FOR AEP MAXIMIZATION

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	Nowadays, Floating Offshore Wind Turbines (FOWT) are innovative technological concepts that can permit the generation of electricity from offshore areas with water depths higher than 50-70 meters. These water depths are considered as a technical and economical limit for conventional fixed-bottom foundations. The European Community has an ambitious strategy concerning offshore renewable energies with the target to reach up to 60 GW of offshore wind capacity by 2030 and 300 GW by 2050. Energy companies are interested in concurring in the achievement of the targets being part of the research process in this field. In this context, to make renewable energy more competitive, further improvements in cost reduction and efficiency increase are needed. As far as concerns wind energy field developments, one of the key topics is wind farm optimization in terms of wind turbine layout and control strategies to reduce power losses due to wake interactions.
Methods and techniques that will be developed and used to carry out the research	Research objectives will be pursued by combining numerical modelling and experimental tests and the state of the art concerning floating wind turbines. Numerical analysis at different fidelity levels and experimental wind tunnel tests for numerical code validation will be carried out. In particular a sensitivity analysis on the reliability of the codes in evaluating AEP (Annual Power Production) will be performed together with a comparative study between bottom fixed and floating solutions.

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Educational objectives	We provide doctoral candidates with high-level scientific training, fostering and refining research and problem-solving abilities by focusing on both theoretical and experimental skills. A PhD in Mechanical Engineering will be able to layout, draft and carry on original research, by leading a research group or working in a team.
Job opportunities	Job opportunities can be found in the wind energy industry, floating wind energy industries, renewable energy. Among the companies and institutions that are cooperating in the research ENI, TUDelft and Peak Wind can be listed. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.
Composition of the research group	3 Full Professors 4 Associated Professors 4 Assistant Professors 3 PhD Students
Name of the research directors	Prof. Marco Belloli

Contacts
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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)	ENI SpA
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
Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707, 13. Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. 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.