POLITECNICO DI MILANO

PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 39th cycle

PNRR 117 Research Field: DYNAMIC WAKE EFFECTS ON FOWTS (FLOATING OFFSHORE WIND TURBINES)

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, it is crucial to rely on tools able to obtain optimal design for a single machine and optimal layout for a wind farm. When more than one wind turbine is installed, it is important to properly evaluate the interaction effects on the machine performance. In order to reach a higher level of reliability and cost-effectiveness, the knowledge of wake modeling represents an interesting topic to be investigated by experimental and numerical activities.
Methods and techniques that will be developed and used to carry out the research	Research objectives will be pursued combining numerical modelling and experimental tests and the state of the art of floating wind turbine. Wind tunnel tests will be performed on two wind turbine models in different arrangements and with the upstream wind turbine moved with a robot to simulate the motion of a floating foundation. Numerical analysis will be performed with mid-

	foundation. Numerical analysis will be performed with mid-fidelity codes to evaluate the dynamic wake's effects on power production and fatigue load. A critical comparison between experimental data and numerical results is expected to be one of the more significant outcomes of the research.
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. Sara Muggiasca

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	0

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.