POLITECNICO DI MILANO

PhD in INGEGNERIA AEROSPAZIALE / AEROSPACE ENGINEERING - 41st cycle

THEMATIC Research Field: MULTIDISCIPLINARY DESIGN OF WIND ENERGY SYSTEMS

Monthly net income of PhDscholarship (max 36 months)
1500.0 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	Systems for generating electricity from renewable sources, and in particular from wind, are continuously expanding to meet the ever-increasing demand for green electrification. Conventional on-shore and off-shore wind turbines have reached dimension and complexity that, together, create ongoing challenges. But even small wind turbines, with a horizontal or vertical axis, have different complexities due to their particular applications and lower costs. Finally, new technologies, such as high-altitude power generation, Airborne Wind Energy Systems, are joining the previous ones to complete the energy mix and pose new technological challenges. These complex systems have their own characteristics but also others in common, including the need to integrate several advance engineering technologies (aerodynamics, structure, material, aeroelasticity. control, etc.) into a single effective multidisciplinary complex system. For this reason, the goal of this research is to develop technologies for the multidisciplinary design, analysis and optimization (MDAO) of such complex systems.
Methods and techniques that will be developed and used to carry out the research	The research is carried out through a mix of numerical and experimental activities. The development of tools for MDAO may be done in synergy with any project-funded experimental tests that are quite regularly found within the research group. The numerical tools are mainly developed within the research group (such as aero-servo-hydro-elastic code, wind turbine design tool, engineering models, etc.) or may be used and updated open source

	tools.
Educational objectives	The main educational objective is to develop skills for the analysis and system-integration of technologically advanced complex systems, such as floating offshore wind turbines, small land-based wind turbines and airborne wind energy systems. Moreover, one learns to identify the appropriate mathematical model for the type of task and to integrate this model into a much more complex multidisciplinary system. Finally, one learns to work in a team, getting involved in activities with other researchers of the group.
Job opportunities	This research activity opens up the industrial world where highly complex systems integration skills are required. Therefore not only in the wind energy sector (wind turbine manufacturers and/or wind farm operators), but also in related industries, such as aerospace, automotive, racing boats, etc.
Composition of the research group	1 Full Professors 2 Associated Professors 0 Assistant Professors 5 PhD Students
Name of the research directors	Prof. Alessandro Croce

Contacts
Dipartimento di Scienze e Tecnologie Aerospaziali - Politecnico di Milano, Via La Masa 34, 20156, Milano, ItalyPhone +390223998322email: alessandro.croce@polimi.itweb site: https://www.aero.polimi.it/en/staff/alessandro.croce, www.poliwind.polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

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

The PhD candidate will receive a desk, possibly through a hot-desking procedure, and a personal computer, if needed. Apart from the compulsory ones, the PhD candidate will have the opportunity to follow additional courses and receive economic support to attend summer schools and participate in conferences. There will be the possibility of paid teaching assistantship.