



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 37th cycle

Research Area n. 1 - Advanced Materials and Smart Structures

**THEMATIC Research Field: DESIGN OF BRIDGES WITH INTEGRATED AERODYNAMIC  
CONTROL SYSTEMS**

**Monthly net income of PhDscholarship (max 36 months)**

**€ 1325.0**

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**

The design of modern medium and long-span bridges is strongly influenced by the requirements of wind resistance and aerodynamic stability. The integration of aerodynamic control systems in bridges could thus potentially lead to more cost-effective design solutions. The aim of the research is to investigate how these systems can be integrated in the designing of bridges in order to identify optimal solutions from both a technical and an economic point of view.

**Methods and techniques that will be  
developed and used to carry out the  
research**

The PhD candidate will study the aeroelastic response of medium-long span bridges with both numerical and experimental modelling. The possibility to develop and implement aerodynamic control devices, requires the availability of numerical tools to simulate the bridge dynamic response to different operating wind conditions. These numerical models rely on aerodynamic coefficients usually obtained through wind tunnel tests. The first phase of the project will aim to validate the available numerical tools and to develop the possibility to implement different aerodynamic control devices. A second phase will be based on simulations to highlight all the potential applications of aerodynamic control systems in bridges. In particular, the methods of using these systems for safety purposes during the construction phases, to increase



	<p>comfort in operating conditions and to improve aeroelastic stability will be investigated. The last phase shall focus on the development of design solutions investigating passive and/or active control systems.</p>
<b>Educational objectives</b>	<p>The PhD candidate will be working in one of the most challenging research fields of wind engineering. The PhD candidate will become an expert in advanced modelling belonging to different fields of engineering. The candidate is supposed to provide original contributions to the development and verification of numerical tools for simulating bridge aeroelastic response and designing control devices. The relationships established with international experts in this field will enable the candidate to develop the capability to cooperate within an international high level research team.</p>
<b>Job opportunities</b>	<p>Future job opportunities are primarily in the wind engineering field, including engineering companies, engineering and project management companies, operators and infrastructure managers. In a more general way, the competence acquired will indisputably be of interest for R&amp;D departments of companies dealing with issues related to road/railway infrastructure design. Besides this, job opportunities will be with national and international academic and non-academic institutions and organizations, engaged in innovation, research and technical development. 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.</p>
<b>Composition of the research group</b>	<p>5 Full Professors 0 Associated Professors 5 Assistant Professors 2 PhD Students</p>
<b>Name of the research directors</b>	<p>Proff. Daniele Rocchi, Giorgio Diana</p>

<b>Contacts</b>
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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	566.36 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>Funding for educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences); funding per PhD student per year: 2nd year: euros 1.534 3rd year: euros 1.534. 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. <b>Computer availability:</b> 1st year: individual use 2nd year: individual use 3rd year: individual use <b>Desk availability:</b> 1st year: individual use 2nd year: individual use 3rd year: individual use</p>