



# PhD in INGEGNERIA STRUTTURALE, SISMICA, GEOTECNICA / STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING - 40th cycle

**PNRR 630 Research Field: STRENGTHENING AND RETROFITTING OF EXISTING  
REINFORCED CONCRETE STRUCTURES THROUGH ADVANCED FASTENING  
TECHNIQUES**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1400.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<p><b>Motivation and objectives of the research in this field</b></p>	<p>Mostly of Italian existing buildings is vulnerable to seismic actions, being building capacity not adequate to accommodate the effects of seismic action, when both capacity and action are evaluated according to modern building codes.</p> <p>In recent years, several retrofitting techniques were developed to strengthen single members and connections among them. However, especially for reinforced concrete structures, most of them are highly invasive when applied to real buildings where, typically, only part of the structures is easily accessible.</p> <p>In this context, there is the strong need of low-invasive and fast-to-be-executed solutions which can minimize overall costs of the intervention and reduced the non-usability time period of the building.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>The research project aims to investigate the behavior of post-installed screw anchors in existing reinforced concrete members to increase their shear capacity. Such application will basically represent a post-installed shear reinforcement for the main member.</p> <p>A holistic approach will be adopted, combining experimental, analytical and numerical approaches, aiming to define the basis for a new assessment and design methods which will also allow to evaluate the</p>



	design methods which will also allow to evaluate the sustainability of the fastening solutions and to introduce the proposed application in international building codes.
<b>Educational objectives</b>	The candidate will become confident with advanced topics in the field of fastening to reinforced concrete under seismic action, mastering advanced experimental and numerical methods. She/he will have also an insight into broader issues, with high technical and socio-economical impact.
<b>Job opportunities</b>	An in-depth research activity in the field of reinforced concrete retrofitting represents an excellent opportunity for any structural engineer in the forthcoming decades. In addition, specific knowledge in the field of connections can guarantee a career in the R&D department of manufacturing companies.
<b>Composition of the research group</b>	0 Full Professors 1 Associated Professors 3 Assistant Professors 8 PhD Students
<b>Name of the research directors</b>	Giovanni Muciaccia

<b>Contacts</b>	
giovanni.muciaccia@polimi.it	

<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>National Operational Program for Research and Innovation</b>	
<b>Company where the candidate will attend the stage (name and brief description)</b>	Tecfi SpA - <a href="https://www.tecfi.it/">https://www.tecfi.it/</a>
<b>By number of months at the company</b>	6
<b>Institution or company where the candidate will spend the period abroad (name and brief description)</b>	CSTB: Centre Scientifique et Technique du Bâtiment ( <a href="https://www.cstb.fr/fr/">https://www.cstb.fr/fr/</a> ) - Purdue University, Lyles School of Civil Engineering ( <a href="https://engineering.purdue.edu/CE">https://engineering.purdue.edu/CE</a> )
<b>By number of months abroad</b>	6



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

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): financial aid per PhD student per year. The Ph.D. course supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year.

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 is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability: each Ph.D. student has his/her own computer for individual use.

Desk availability: each Ph.D. student has his/her own desk, cabinet and locker.