POLITECNICO DI MILANO

PhD in INGEGNERIA STRUTTURALE, SISMICA, GEOTECNICA / STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING - 38th cycle

PNRR_352 Research Field: STRATEGIES FOR SEISMIC ASSESSMENT AND RETROFITTING OF SCHOOL BUILDINGS

Monthly net income of PhDscholarship (max 36 months)
€ 1195.5 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 research is inserted in the PNNR Mission 2, Component 3 (M2C3): Energy efficiency and rehabilitation of buildings; in particular MEASURE 2 - Energy and seismic efficiency of private and public buildings. Seismic assessment of schools is an urgency in Italy. Dynamic linear analyses are the standard but often overestimate the risk, imposing expensive and not optimized retrofitting. Accurate nonlinear time history analyses are very demanding. Using the large database offered by the Industry involved, a hybrid approach will be developed based on coupling the linear model of the whole building with nonlinear models of sub-parts chosen through typological studies, in order to maximize the prediction capability of seismic analysis, minimizing the effort. The final goal will be the development of a sustainable retrofitting strategy that minimizes the intervention costs relative to expected damage (direct and indirect cost).
Methods and techniques that will be developed and used to carry out the research	The research will include the use of linear and nonlinear static and dynamic analyses, use of diagnostic tools for feedings the numerical models, use of artificial intelligence algorithms to process all the available data and find correlations between results of different analysis methodologies. The presence of the Company is

	strategic, because it owns a large database of real world cases; moreover it will share instruments and competences for in situ material and structural properties characterization: this is a fundamental step for correctly modelling the structures and obtaining reliable results. Moreover, interdisciplinarity and collaboration with research centres abroad and domestically will be promoted.
Educational objectives	The Ph.D. student is expected to develop multidisciplinary skills, ranging from an in-depth knowledge of the structural mechanics of RC buildings, to the use of advanced computational methods and the development of tools for the analysis and management of big data, up to the acquisition of skills in cost-benefit analyses in relation to sustainable retrofitting intervention choices.
Job opportunities	Public authorities, private companies, managing bodies, and professional firms involved in assessment, inspection, diagnostics, monitoring, and/or maintenance of private and public buildings.
Composition of the research group	1 Full Professors 4 Associated Professors 0 Assistant Professors 0 PhD Students
Name of the research directors	Lorenza Petrini

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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	597.76 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	STUDIO BAFFO SRL, http://www.studiobaffo.it .
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

Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research:

- University of Liege
- University of Washington
- Eucentre
- Harpaceas

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): 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 assistanship (availability of funding in recognition of support to teaching activities by the PhD student): Ph.D. students are encouraged to apply, upon prior authorization, to the calls to support teaching activities at the undegraduate and Master levels at Politecnico, being paid for that. The teaching assistantship will be limited up to about 80 hours, maximum half of them devoted to teaching and classroom activities and the rest to support classworks and exams.

Computer availability and desk availability: Each Ph.D. student has his/her own computer for individual use.Each Ph.D. student has his/her own desk, cabinet and locker.