



PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 40th cycle

Research Area n. 3 - Environmental and Hydraulic Engineering and Geomatics

PNRR 630 Research Field: INNOVATIVE APPROACHES AND TECHNOLOGIES FOR THE
MANAGEMENT OF WATER DISTRIBUTION INFRASTRUCTURES

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| 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 | |
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| Motivation and objectives of the research in this field | <p>Water distribution networks are strategic infrastructures whose operability is of primary importance for population well-being. In a global context of fast transformation due to social and environmental actions, water systems are heavily solicited up to the achievement of their functional limits. The introduction of innovative instrumentations and methods for the improvement of network performances can represent a valid opportunity to overcome service limitations and improve network operability and resilience. Some objectives of the research are:</p> <ul style="list-style-type: none"> • Analysis and classification of the history of company projects in order to populate a forecast database for the preventive selection of the best approaches and methods of intervention on the networks, also through the use of artificial intelligence algorithms. • Methodologies for planning maintenance and updating of networks in order to optimize the ARERA service, indicators and incentives. • Strategies for the implementation of advanced multi-objective monitoring systems (pressures, losses, resilience, energy, water quality,...). |
| Methods and techniques that will be developed and used to carry out the | The research method follows several steps beginning |



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| <p>research</p> | <p>from a wide technical review of the state of the art about water distribution network enhancement. The steps regard the use of several approaches, specifically:</p> <ul style="list-style-type: none"> - the implementation and use of network modelling methodologies to reproduce real environments and analyse the actual performance of the network; - the modelling of hydraulic devices behaviour in real conditions and their implementation in network modelling software; - the execution of laboratory performance tests on hydraulic devices, like pumps, PAT, turbines, valves and innovative devices to be applied in networks. <p>A phase of project review is foreseen to account for differences between achieved and expected results and to eventually adjust planning to improve benefits for underperforming activities.</p> <p>The context of the project implies the consideration of several national and international regulations with particular attention to the indicators and key performance parameters defined by the International Water Association (IWA).</p> |
| <p>Educational objectives</p> | <p>Learn about best practices and innovative technologies for water distribution network enhancement. Learn how to experimentally evaluate the performances of hydraulic devices dedicated to pressure control and energy recovery. Gain experience in all aspects related to efficiency of water distribution networks.</p> <p>Prepare highly qualified researchers and professionals to efficiently tackle engineering scenarios linked to water network management, leakage control and climate changes. Close collaboration between PoliMI and the industrial partner yields a unique opportunity for the PhD to be trained in diverse aspects contributing to shape their future academic or professional careers, including also the economic-management and the sustainable use of water and energy resources.</p> |
| <p>Job opportunities</p> | <p>This experience could open to academic or professional opportunities as expert in water distribution network efficiency, asset management and optimization of operations. Energy manager.</p> |



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| Composition of the research group | 1 Full Professors 0 Associated Professors 4 Assistant Professors 4 PhD Students |
| Name of the research directors | Stefano Malavasi |

| Contacts | |
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| Stefano.malavasi@polimi.it; +39 02 2399 6261; www.fluidlab.polimi.it | |

| Additional support - Financial aid per PhD student per year (gross amount) | |
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| Housing - Foreign Students | -- |
| Housing - Out-of-town residents (more than 80Km out of Milano) | -- |

| Scholarship Increase for a period abroad | |
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| Amount monthly | 700.0 € |
| By number of months | 6 |

| National Operational Program for Research and Innovation | |
|---|----------------------------|
| Company where the candidate will attend the stage (name and brief description) | J+S S.p.a. - www.jpilus.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 |
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| <p><u>Educational activities</u> (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): the Ph.D. programme supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year.</p> <p><u>Teaching assistanship</u> (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.</p> <p><u>Computer availability and desk availability</u>: 1st year +2nd year +3rd year: individual use.</p> |