POLITECNICO DI MILANO

PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

Research Area n. 2 - Sustainable Mobility

PNRR_352 Research Field: METHODOLOGIES FOR EVALUATING THE WIND SPEED ALONG RAILWAY LINES AND THE RISK OF TRAIN OVERTURNING DUE TO CROSSWINDS

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	
Motivation and objectives of the research in this field	The research activity is related to Mission n.3, C1 of PNRR (Piano Nazionale di Ripresa e Resilienza), focusing on investments on railway infrastructures. The activity aims at the development of new simplified methods for evaluating the overturning risk due to crosswind to increase safety and efficiency of railway lines for high-speed and conventional trains, as well as freight trains.
Methods and techniques that will be developed and used to carry out the research	Current approaches for vehicle dynamics modelling and wind simulations will be applied and extended as part of the project. In particular, the student will: • analyse and develop numerical models/experimental techniques, characterised by different levels of complexity and precision, useful for the probabilistic assessment of the wind speed along the railway line; • study and compare different vehicle dynamics models for evaluating the overturning risk of a train under crosswind; • develop and implement a dedicated software, for the extended use of the simplified methodology to railway lines;

Educational objectives	The student will learn: research project management and publishing skills; analytical models and experimental tests development skills (particularly numerical models for wind probabilistic assessment, multi-body models for vehicle dynamics simulation, measurements of wind-vehicle relative velocity/aerodynamic characteristics by full scale/wind tunnel tests); presentation and teaching skills.
Job opportunities	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. Companies in the transportation sector (RFI but also Mercitalia Intermodal, Trenitalia and Hitachi Rail, Bombardier, Alstom) who have been collaborating for years with the POLIMI research group, will be very interested in hiring a PhD-graduate with application experience in the sector.
Composition of the research group	1 Full Professors 1 Associated Professors 2 Assistant Professors 1 PhD Students
Name of the research directors	Prof. Gisella Marita Tomasini

Contacts
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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	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)	Rete Ferroviaria Italiana S.p.A.
By number of months at the company	6
Institution or company where the	University of Birmingham (or) Central South University (or) NablaFlow

candidate will spend the period abroad (name and brief description)	
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Financial aid is available for all PhD candidates (purchase of study books and materials, fundingfor participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707, 13. Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. 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.