



DIPARTIMENTO DI INGEGNERIA “ENZO FERRARI”
Corso di Laurea in Ingegneria Civile e Ambientale

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terrà un seminario dal titolo

**Unified shear capacity equation for reinforced concrete members
based on a variable-angle truss model with machine-learning-
calibrated coefficients**

Giovedì 14 Dicembre 2023 - Ore 11.00

Aula P1.3 (Edificio M025, via Vivarelli 10/1)

Abstract *The development of shear capacity equations for reinforced concrete (RC) beams and columns has been historically pursued starting from the conceptualization of a resisting mechanism. Recently, machine learning techniques are attracting more and more interest in this field. Mechanics-based and data-driven approaches have been considered independently so far. Conversely, this work aims at presenting a hybrid alternative way for deriving the shear capacity equation for RC beams and columns with rectangular/square cross-sections, in which a mechanics-based code-conforming formulation is improved thanks to a machine-learning-aided approach. Specifically, the variable-angle truss resisting mechanism is enriched by means of Genetic Programming. So doing, novel expressions for the two fundamental coefficients ruling the concrete contribution are defined to better match experimental data. The performance of the newly obtained equation is first examined considering beams and columns with solid cross-section subjected to uniaxial shear. Columns with hollow cross-sections subjected to uniaxial shear are considered later on. Finally, ongoing experimental and analytical efforts focused on extending the proposed model to biaxial shear will be presented. Overall, this work establishes a unified shear capacity equation for RC beams and columns. Moreover, this work also demonstrates that merging mechanics-based and data-driven methods can be beneficial in the development of capacity equations since it allows preserving the physical meaning of the resisting mechanism while enhancing the accuracy of the final predictions by means of machine learning techniques.*

Giuseppe Quaranta *is Associate Professor in Structural Engineering at Sapienza University of Rome since 2019. His main research interests deal with structural monitoring and control (i.e., sensing systems for structural monitoring, dynamic identification, diagnostic of civil structures and infrastructures, passive devices for vibrations control) as well as structural concrete (i.e., analysis and design of concrete structures under static and dynamic loads, also accounting for environmental effects).*

