International Doctorate in Civil and Environmental Engineering

A multilevel approach for the assessment of the structural risk and resilience of bridges and viaducts in road networks

PhD Student: Antonella Cosentino

Info	
Home Institution	Università di Pisa
Joint Supervision	Ghent University
Italian Tutor/Co Tutor	Prof. Walter Salvatore
Foreign Tutor/Co Tutor	Prof. Robby Caspeele
Email	antonella.cosentino@unifi.it

Abstract

Bridges are crucial elements in the transportation networks allowing to cross natural and artificial obstacles. A bridge failure, or simply a loss of performance, generates important consequences on the whole road network and traffic distribution. Despite being such crucial elements, the attention of stakeholders to bridges in the last decades has not always been sufficiently high. Indeed, most part of worldwide existing infrastructures is dated and is degrading due to ageing, environmental stressors, man-made hazards and natural hazards. Considering the criticalities related to the process of management of these structures, on April 2020, guidelines for the classification of risk, the safety evaluation and structural monitoring of existing bridges was published in Italy. They introduced new approaches for the management of existing bridges, including new provisions for the assessment of safety evaluation, highlighting the importance of the knowledge in the whole process.

Starting from the concepts introduced in the guidelines, the main goal of this research is the definition of a novel methodology for the evaluation of the structural reliability of existing bridges in real time, through the implementation of structural monitoring systems. This requires the knowledge of the basic variables and the evolution of degradation phenomena, over time, in order to update automatically the probabilistic and structural models. The methodology will be validated through the application to two real bridges in Italy: the first one is a R/C bridge located on an extra-urban road, the other one is a P/C bridge on an Italian highway.