



POLITECNICO
MILANO 1863

SEMINAR ANNOUNCEMENT

Room Beltrami, Building 5, ground floor, Leonardo Campus
Department of Civil and Environmental Engineering

26 March 2018 – 14:30-15:30

Innovative SHM solutions for rapid post-earthquake structural assessment: from vibration-based systems to smart materials

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Abstract

Structural Health Monitoring (SHM) systems aim at the automated condition assessment of structures through observation and analysis of data collected on-site by sensing systems. The application of long-term SHM systems is especially promising, yet rarely applied, in the field of earthquake engineering, whereby SHM systems allow (i) to highlight if a structure has undergone permanent damage after a shock or if it is accumulating damage during an earthquake sequence, (ii) to check if a damaging process is stable in time or it tends to get worse and (iii) to compare the response of different monitored structures after an event, so as to optimize the control activities and the restoration interventions.

The talk will cover recent research work carried out at the Laboratory of Structural Dynamics of University of Perugia, Italy, in the framework of research projects funded at both national and European levels to address some of the most relevant challenges in SHM. Two complementary topics will be covered. The former topic is a novel methodology for long-term vibration-based SHM and earthquake-induced damage detection in a changing environment, based on automated operational modal analysis, multivariate statistical analysis and novelty detection. This part of the talk will particularly focus on the verification of the effectiveness of this methodology through application to full-scale monumental structures that have undergone earthquake-induced damage during the recent central Italy seismic sequence. The latter topic concerns the development of novel smart concretes and smart bricks for self-sensing structures, that are obtained by doping traditional construction materials with suitable conductive nanoinclusions enabling the functional properties of strain-sensing and damage-sensing.

Reference: **Prof. Matteo Bruggi** (matteo.bruggi@polimi.it)

Bio-sketch

Prof. Filippo Ubertini is an Associate Professor of Structural Design at the Department of Civil and Environmental Engineering of University of Perugia. Dr. Ubertini received his PhD in Civil Engineering from University of Pavia in 2009 and was visiting scholar at Columbia University in 2008.

He is author of more than 100 scientific papers among which 57 in refereed international journals. He is currently member of the editorial boards of Shock and Vibrations, Mathematical Problems in Engineering and Journal of Smart Cities.

Aided by a group of young and motivated researchers, he is currently leading a multidisciplinary research effort focusing on novel solutions for structural health monitoring, with emphasis on dynamic methods, smart materials and applications to earthquake engineering and cultural heritage structures. Dr. Ubertini's research has been acknowledged through mentions in media and awards.

