PROBABILISTIC SEISMIC RISK AND RESILIENCE ASSESSMENT FOR PROCESS PLANTS AND INFRASTRUCTURES

Abstract The tremendous impact of natural hazards, such as earthquakes, tsunamis, flooding, etc, which triggered technological accidents, referred to as natural-technological (NaTech) events, was demonstrated by the recent Tohoku earthquake and the following Fukushima disaster in 2011. Although the number of lives lost each year to natural disaster is reduced, the recovery costs of major disasters continue to rise. In fact, each year, NaTech disasters cause an estimated $ 52 billion in damages in the United States in terms of life lost, disruption of commerce, properties destroyed, and the costs of mobilizing emergency response personnel and equipment. In Italy, the recent earthquakes caused damages for about € 23.5 billion. Hence, the objective of this seminar is to present quantitative risk assessment methodologies for seismic loss prevention of special risk LNG and petrochemical plants. Thus, the analysis of a single failure or a loss of containment in a single equipment are considered as well as the case where NaTech events often represent a common cause leading to the simultaneous occurrence of several interacting failures, which can often interfere with rescue operations. The proposed probabilistic-based methodology can properly take into account, ground motions of increasing spectral acceleration, damage and losses by means of finite element models, nonlinear analyses and conditional probability distributions. Moreover, examples of losses are provided for infrastructures present in the nearby built environment. Finally, resilience concepts are introduced to take into account recovery and functionality both for plants and nearby community performance during and after a hazard event.

Lecturers
Oreste S. Bursi, PhD - Prof. of Structural Dynamics and Control, DICAM, UNITN
e-mail: oreste.bursi@unitn.it - URL: http://me.unitn.it/oreste-bursi
Rocco di Filippo – PhD student, DICAM, UNITN
e-mail: rocco.difilippo@unitn.it

Scientific Coordinator
Stefano Bonaccorsi, Dipartimento di Matematica, UNITN