

# HEADED PAPER



EXTREME LOADING ANALYSIS OF  
PETROCHEMICAL PLANTS AND DESIGN OF  
METAMATERIAL-BASED SHIELDS FOR ENHANCED  
RESILIENCE



<http://r.unitn.it/en/dicam/xp-resilience>

## SEMINAR ANNOUNCEMENT

The following seminar will be organised on 13.06.2019 at 11.30 in room 2C

### LOSS ASSESMENT METHODOLOGY FOR INDUSTRIAL AREAS WITH CONSIDERATION OF DOMINO EFFECTS

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**Abstract** Industrial facilities are essential components of the built environment, since they provide fundamental services for the everyday functioning of the community. Over the past decades, more and more urban centres developed in the close surrounding of industrial facilities, giving birth to industrial areas where residential buildings and facilities coexist. The consequence of this coexisting is the increase of risk for losses associated with natural hazardous events such as major earthquakes. This issue should not be neglected since industrial facilities often deal with hazardous materials, which, if released, can cause catastrophes for the surrounding communities, as demonstrated by the recent Tohoku earthquake and the following Fukushima disaster in 2011. Indeed, the leaking of hazardous material can trigger fire, explosion, toxic dispersion and other detrimental consequences. These phenomena can affect other components of the facility and other ordinary buildings in the vicinity, although they may not have been directly damaged by the earthquake. Such propagation of damage is called “domino effect”. Hence, the objective of this seminar is to present a loss assessment methodology with consideration of the domino effect. The losses caused by seismic events are evaluated on the basis of fragility functions for different damage states, while Monte Carlo Method is applied for simulating step-by-step all the critical phases of the damage propagation. The methodology also allows to perform a loss disaggregation, which provides an insight into the contribution of each structural unit and each damage state to the total loss. The loss disaggregation can be used to identify the smartest strategy to improve the design of an industrial plant in order to reduce the expected loss for the entire surrounding built environment.

**Short Biography:** Francesca Celano graduated in Structural and Geotechnical Engineering at the University of Napoli Federico II. She was involved in many research projects funded by ReLUIS (Rete dei Laboratori Universitari di Ingegneria Sismica), and worked on the assessment of the seismic risk of structures designed according to the construction code in Italy. In 2017 she won a Marie Curie research fellowship and enrolled in the Doctoral Study program Built Environment at the Faculty of Civil Engineering and Geodesy, University of Ljubljana. Her research activities are in the framework of the project “Xp-Resilience”, which deals with the extreme load analysis of petrochemical plants.

The seminar is organised by the XP-RESILIENCE research group

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Prof. Oreste S. Bursi

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