



ASME PVP 2018 CONFERENCE



EXTREME LOADING ANALYSIS OF PETROCHEMICAL
PLANTS AND DESIGN OF METAMATERIAL-BASED
SHIELDS FOR ENHANCED RESILIENCE
<http://r.unitn.it/en/dicam/xp-resilience>



1st International Workshop on Risk and Resilience of Industrial installations against natural threats and mitigation strategies

Prague, Czech Republic, 19-20 July, 2018

BACKGROUND

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, for instance by the recent Tohoku earthquake and the following Fukushima disaster in 2011 or by the UK's 2015 winter floods which topped £5bn, with thousands of families and businesses that faced financial problems because of inadequate or non-existent insurance. The NaTech problem is quite relevant as up to 10% of industrial accidents, involving the release of Chemical, Biological, Radiological, Nuclear and high yield Explosives (CBRNE) substances, were triggered by natural hazards. To implement and support the Seveso II Directive 2012/18/EU which regulates the control of major accident hazards involving dangerous substances, XP-RESILIENCE intends to establish a network of individual research projects working towards Advanced Modelling and Protection -via metamaterial-based isolators/layouts- of Complex Engineering Systems for Disaster Reduction and Resilient Communities. In this respect, this workshop has the aim to offer to students and scholars a clear overview of the problems and the available solutions and tool. With important experts on Resilience and Na-tech risk the workshop will be a unique occasion to familiarize with this hot topic and be in contact with the resilience and risk calculation community.

INTERNATIONAL SCIENTIFIC COMMITTEE:

F. Paolacci, A.C. Caputo, S. Alessandri, O.S. Bursi, N. Tondini, M. Dolsek, S. Bousias, L. Di Sarno, A. Klimpel, M. Hjiq, H. Wenzel, E. Padgett, G. Cimellaro, M. Pozzi, E. Patelli, S. Marelli, M. Ciucci (INAIL)

OBJECTIVES OF THE WORKSHOP

The main objective of this workshop is to familiarize Early Stage and Experienced Researchers with the state-of-the-art of risk and resilience of industrial installations. At the end of the course, attendants should acquire the basic knowledge concerning:

- Basic and advanced concepts for risk and resilience calculation
- Vulnerability analysis of the most critical industrial facility units
- Risk analysis methods of major-hazard industrial installations
- Resilience concepts applied to industrial facilities
- Concepts application through case studies

WORKSHOP SCHEDULE July 19-20, 2018

1st DAY - Thursday 19 July

07:15-8:15	Breakfast
08:15-8:30	Workshop Opening <ul style="list-style-type: none">• Pierre Martiny –Program Conference Chair of ASME PVP 2018 Conf.• Hakim Bouzid - Technical Program Chair pf ASME PVP 2018 Conf.• Oreste S. Bursi – Coordinator of XP-Resilience Project• Fabrizio Paolacci – Workshop Organizer
08:30-10:00	G. Cimellaro (Polytechnic of Turin, Italy) Keynote Lecture: Key Issues in Resilience calculation of critical infrastructures
10:00-10:15	Coffee Break
10:15-12:00	O.S. Bursi (University of Trento, Italy) Metamaterial-based shield for resilience enhancement of petrochemical plant
12:00-14:15	Lunch
14:15-16:00	A.C. Caputo (Roma Tre University, Italy) Problems and perspectives in seismic risk and resilience of chemical process plants for decision making
16:00-16:15	Coffee Break
16:15-18.00	F. Paolacci (Roma Tre University, Italy) A probabilistic methodology for the risk assessment of process plants including domino effects.

2nd DAY – Friday 20 July

07:15-8:15	Breakfast
08:15-10:00	J. E. Padgett (Rice University, USA) Keynote Lecture: Coastal resilience of chemical and petrochemical storage tanks
10:00-10:15	Coffee Break
10:15-12:00	E. Patelli (University of Liverpool, UK) Efficient simulation techniques for reliability and resilient analysis of complex systems.
12:00-14:15	Lunch
14:15-16:00	M. Pozzi (Carnegie Mellon University, USA) Decision making, maintenance, operation and resilience
16:00-16:15	Coffee Break
16:15-18:00	S. Marelli (ETH, Zürich; Switzerland) Metamodels for uncertainty quantification and structural reliability analysis
18:00	Closure and Acknowledgments

Who should attend

Graduate students, postdoctoral researchers and practitioners willing to do research and applications in the field of nonlinear simulation/development of structures and infrastructures under extreme natural events

Registration

Please refer to:

<https://www.asme.org/events/pvp/register#reg-fees>

To express interest in participating please send an e-mail to: marina.cibati@uniroma3.it by June 15, 2018



Prof. Jamie E. Padgett, Rice University in Houston, USA. The research of Prof. Padgett focuses on the application of probabilistic methods for risk assessment of structural infrastructure, including the subsequent quantification of resilience and sustainability. Her work emphasizes infrastructure portfolios such as regional portfolios of bridges or oil storage tanks exposed to multiple hazards, including earthquakes, hurricanes, or aging and deterioration. She has published over 175 articles in journals or archived conference proceedings in the general area of structural response, reliability and life-cycle assessment. Dr. Padgett was the founding Chair of the ASCE technical committee on Multiple Hazard Mitigation, and is an active member of several national technical committees within ASCE and TRB. She currently serves on editorial boards for the ASCE Journal of Bridge Engineering, ASCE Journal of Structural Engineering, and Sustainable and Resilient Infrastructure. Dr. Padgett has received several awards and recognitions including the 2017 ASCE Walter L. Huber Civil Engineering Research Prize, and the 2017 (R+T)² Award at Rice University for excellence in research and teaching. She also was awarded the 2011 National Science Foundation Faculty Early Career Development (CAREER) Award and the 2016 IALCCE Junior Award for "contributions to life-cycle analysis of structures". Among other projects, Dr. Padgett currently works as a part of several large national or regional research efforts including the NIST Center of Excellence for Community Disaster Resilience (headquartered at Colorado State University), the NSF NHERI Cyberinfrastructure "DesignSafe-CI" (headquartered at University of Texas, Austin), and the Severe Storm Prediction Education and Evacuation from Disasters (SSPEED) Center (headquartered at Rice University)



Prof. Cimellaro Polytechnic of Turin, Italy. His primary field of investigation is Earthquake Engineering with emphasis on defining Quantification of Resilience of systems. Resilience is defined as the capacity of systems to rebound after severe disasters of any type. This is a new research field that embraces both theoretical and experimental aspects. It is an interdisciplinary research area that combines engineering with organizational, economical, and social aspects. Prof. Cimellaro's interdisciplinary research investigates representations of health system properties and processes, creating quantitative modeling solutions for a better understanding of sustainable use and resilience of systems that often challenges collaborating teams consisting of scientists, social scientists, engineers, lawyers and extension specialists across a wide spectrum of disciplines. His major contribution has been the quantification of the concept of disaster resilience in which a unified terminology and a common resilience framework is proposed that can be used for analyzing critical facilities (e.g. hospitals, military buildings, etc.), and utility lifelines (e.g. electric power systems, transportation networks, water systems etc.). His interdisciplinary recent research has focused on quantifying the social and economic impact of critical infrastructure disruption during disasters. The proposed framework can be used for describing the losses as well as the recovery process of any of the systems mentioned above; however, it can become more complex when comprehensive loss estimation or recovery models (e.g. meta-models for the case of health care facilities) are used. Even so, Dr. Cimellaro current research leads toward the definition of more complex recovery models that are able to describe the process over time and the spatial definition of recovery.



Dr Fabrizio Paolacci, Roma Tre University, Italy. He is currently Assistant Professor in Structural Engineering at University Roma Tre – Department of Engineering. His main scientific interests are focused mainly on: a) Performance-based design of steel-concrete composite bridges, b) Assessment and reduction of the seismic risk of reinforced concrete buildings and bridges, c) Seismic risk of major-hazard industrial plants and applicability of innovative protection systems (base isolation and energy dissipation), e) Seismic vulnerability of high-voltage electric networks and substations and applicability of innovative seismic protection systems, f) Passive and semi-active control of structures. He gained a long standing experience in the management of research projects about experimental assessment of the seismic response of structures. He has been Visiting Scholar in 1999 at the Department of Civil and Environmental Engineering of University of California at Berkeley. From 2008 to 2013, he assumed the role of scientific coordinator of the Laboratory of Testing Materials and Structures of the Department of Structures of the University Roma Tre; currently He is the Chair of the Seismic Engineering Technical Committee of ASME PVP Division. Finally, He is author of more than 100 publications on International peer-reviewed Journals and conferences., <https://www.romatrestrutture.eu>



Dr Matteo Pozzi, Carnegie Mellon University, USA. Matteo Pozzi obtained a Ph.D. in structural engineering from the University of Trento (2007), he was a post-doc researcher at UC Berkeley (2011-12) and since 2012 he is an assistant prof. in the Civil & Environmental Engineering dept. at Carnegie Mellon University, in Pittsburgh, Pennsylvania. His research deals with risk analysis and decision optimization for civil infrastructure systems, using engineering models and sensor data, and he teaches courses on Urban Systems Modeling and on Data Management. He is co-author of about 30 journal papers and in 2017 he got a CAREER Award from the National Science Foundation.



Prof. Oreste S. Bursi, University of Trento, Italy. Oreste S. Bursi graduated in Mechanical Engineering at the University of Padua in 1984, and achieved his PhD. in Mechanical Engineering at the University of Bristol. He is full Professor of Structural Dynamics and Control at the University of Trento since 2001. He has always been interested in complex dynamical non-linear systems consisting of structural and mechanical components as well as control devices. Devices have been used both to control in real time or test dynamical systems subjected to natural hazards based on computer hardware and software. Thus, through the analysis and design of such complex systems that require both advanced modelling and simulation and experimental techniques, Oreste S. Bursi has built up his scientific background tailored to multidisciplinary problems. As a result, he became the leader researcher in Europe in the area of heterogeneous dynamic substructure coupling. Recently, he addressed his research interests towards system identification and structural health monitoring of complex systems, e.g. bridges, pipes, etc., and quantitative risk assessment of critical petrochemical facilities subjected to technological accidents triggered by natural disasters.

<http://r.unitn.it/en/dicam/nhmsdc>

<http://me.unitn.it/oreste-bursi/>



Prof. Antonio C. Caputo, Roma Tre University, Roma, Italy. Dr. Caputo was born in Genova, Italy on June 22, 1966. He received his Master's degree in Mechanical Engineering from the University of Roma, La Sapienza, in 1991. In 1995 he obtained a Ph.D. degree in Energy Engineering and joined the Faculty of Engineering at the University of L'Aquila, Italy, where in 2006 he became a full professor in Industrial & Plant Engineering. In 2009 he moved to Roma Tre University. His primary research interests include risk assessment and safety evaluation of industrial plants, industrial logistics, analysis and design of manufacturing systems and process plants, operations management. Overall, prof. Caputo authored more than 150 scientific papers including more than 60 published in peer-reviewed international journals. He collaborated with the Gran Sasso Nuclear Physics National Laboratory, in carrying out qualitative and quantitative risk assessment for experimental activities (including world famous Borexino Project), and participated to several European Union-funded research projects. He is Head of the Laurea Degree Programs in Mechanical Engineering and Aeronautical Engineering at the Roma Tre University. He has been member of the evaluating commission of the National Scientific Qualification program for University professors recruitment, as well as member of the Committee of Expert Evaluators for the Academic Research Quality Assessment campaign 2011-2014 organized by the Italian National Agency for University and Research Evaluation. In 1991-92 he served as a volunteer in the Italian National Corps of Firefighters.



Prof. Edoardo Patelli, University of Liverpool. Edoardo Patelli is a Senior Lecturer in Uncertainty and Computational modelling, at the Institute for Risk and Uncertainty, University of Liverpool and honorary member of the National Tsing Hua University, Taiwan. His the co-investigator and co-director of the EPSRC-ESRC Centre for Doctoral Training in "Quantification and Management of Risk & Uncertainty in Complex Systems & Environments" and Chair of the Technical Committee on Simulation for Safety and Reliability Analysis (ESRA - European Safety and Reliability Association) and the PI of EPSRC project in Resilience modelling for improved nuclear safety.

He graduated in Nuclear Engineering at the Politecnico di Milano (Italy) in 1999. Later, he worked as assistant researcher in the group of Professor Marzio Marseguerra and Enrico Zio and then carried out his doctoral work in Radiation Science and Technology at the same Institute. In 2006 he moved as research associate at the University of Innsbruck (Austria) in the group of Professor Schuëller where he became group leader

and principal developer of the COSSAN software, a general purpose software for risk management and uncertainty quantification.

Dr. Patelli is leading an interdisciplinary research group focused on developing and apply efficient tools able to deal with scarce data and vagueness of information for Risk, Safety and Uncertainty Quantification across different sectors. Recent applications include the analysis and reliability of safety critical systems, resilience of power networks and smart grids and develop tool for decision making under uncertainty. Patelli has published more than 200 peer-reviewed publications in International journals and in Proceedings of International Conferences and 4 book chapters. He is a guest-editor on International journals (e.g. International Journal of Reliability and Safety and Structural Safety) and editorships Springer's "Encyclopaedia of Earthquake Engineering". He also co-organised multi-disciplinary international conferences in risk and vulnerability (ASCE-ICVRAM-ISUMA 2014), and probabilistic analyses (e.g. IPW2015) and reliability analysis (ESREL 2019).



Dr. Stefano Marelli, is a senior Research Associate at the Chair of Risk, Safety and Uncertainty Quantification in ETH Zurich (www.rsuq.ethz.ch).

He is the project leader of the UQLab software framework (www.uqlab.com). His research focus comprise active-learning- and metamodel-based techniques, probabilistic modelling and scientific software development for uncertainty quantification and reliability analysis. His lecturer activities include the "Structural Reliability and Risk Analysis" and "Uncertainty Quantification in Engineering" MSc courses at ETH Zurich.