



SPONSE

INTERNATIONAL ASSOCIATION FOR
THE SEISMIC PERFORMANCE OF
NON-STRUCTURAL ELEMENTS

Fourth International Workshop on Seismic Performance of Non-Structural Elements

May 22-23, 2019 Pavia, Italy

SPONSORS





DETAILED PROGRAMME

May 22, 2019

08:15-09:00 **Registration**

09:00-09:15 **Opening Ceremony**

09:15-09:55 ▼ **Keynote 1:**

Recommendations for Improved Seismic Performance of Non-Structural Components
Dr. Maryann Phipps

10:00-11:20 **Parallel Sessions:**

Session 1A - Seismic Performance of Architectural Elements (Room: Auditorium)

1. Numerical dynamic analyses of suspended ceilings with an innovative bracing system
S. Brandolese and R. Scotta
2. Innovative experimental methodology to evaluate the seismic performance of suspended ceilings
L. Fiorin, A. Palmeri, M. Lombardo and M. Harrison
3. Shaking-Table Evaluation of Seismic Performance of Suspended Steel-Panel Ceiling
J. Lee, S. In, D. Jung, S. Lee and B. Cho
4. Study on In-Plane Shear Stiffness in US-style Suspended Ceiling
Y. Sato, K. Tea and S. Motoyui

Session 2A - Seismic Performance of Building Utility and Contents (Room: Music Room)

1. Numerical modelling of the cyclic response of threaded joints for the seismic behaviour evaluation of piping systems
C. Blasi, D. Perrone, M.A. Aiello and M.R. Pecce
2. Shaking Table Testing of the Electric Switchboard Cabinet Employing Equipment Isolators
D. Shin, W. Lee and H. Kim
3. Probabilistic seismic fragility assessment of LNG pipe rack – piping system accounting for soil-structure interaction
L. Di Sarno and G. Karagiannakis
4. Structural identification of a fire-protection piping system
A. De Angelis, V. Pepe, G. Maddaloni and M.R. Pecce

Session 3A - Seismic Design and Retrofit of Non-Structural Elements (Room: Library)

1. A design procedure for seismic isolation retrofit of hospitals tailored to the protection of non-structural components
E. Gandelli, P. Dubini and V. Quaglini
2. Seismic Assessment and Retrofit of Non-Structural Components: Practical Oriented Considerations
R. Siano, A. Fatnassi and M. Cademartori
3. Problematic Conditions of Non-structural Components Installed Without Seismic Considerations in Critical Structures: Observations from the Field
E. Pantoli and B.E. Kehoe
4. Overview of SERA Project: 3D shaking table tests on an integrated low-damage building system
S. Pampanin, J. Ciurlanti, S. Bianchi, M. Palmieri, D. Grant, G. Granello, A. Palermo and A. Correia

11:20-12:00 *Coffee Break*


12:00-13:20 Parallel Sessions:
Session 1B - Seismic Performance of Architectural Elements (Room: Auditorium)

1. Structural Behavior of Screw Connections between Cold-Formed Steel Studs and Gypsum Boards
K. Choi and H. Kim
2. Generating Analytical Fragility Curves for Gypsum Partition Walls with Different Aspect Ratios
H. Salmasi Javid, S. Soroushian, E. Rahmanishamsi and E. M. Maragakis
3. Shake Table Test for Seismic Performance Evaluation of Cladding System Installed at The Bolted Connection Type Steel Truss
H. Park and S. Oh
4. SINIAT-DIST project: innovative plasterboard partitions for seismic prone zones
G. Magliulo, C. Petrone, P. Lopez and J.P. Boisvert

Session 2B - Seismic Performance of Building Utility and Contents (Room: Music Room)

1. Non-linear behaviour of anchored irregular rigid bodies under Ricker pulses excitations
Ramos G.P., Reinoso A.E., Arredondo V.C. and Torres P.N.M.
2. Shaking Table Tests of Freestanding Ceramic Vase
B. Huang, X. Hua, G. Selim and W. Lu
3. Considerations in the Design of Anchorage for Nonstructural Components and Nonbuilding Structures
J. Silva and R. Piccinin
4. Fragility and risk assessment of rocking building contents hosted in a four-storey RC building
M. Fragiadakis and S. Diamantopoulos

Session 3B - Seismic Design and Retrofit of Non-Structural Elements (Room: Library)

1. Improving the seismic performance of non-structural elements using Building Information Modelling
D. Perrone and A. Filiatrault
2. Seismic assessment and qualification of non-structural elements in Europe: a critical review
D. Perrone, E. Brunesi, F. Dacarro, S. Peloso and A. Filiatrault
3. Evaluation of Equivalent Static Analysis Method for Seismic Design of Non-Structural Elements
S. Jun, C. Lee, S. Lee, S. Kim and J. Park
4. Evaluation of Seismic Design Force Considering Dynamic Behavior of Water Tanks Supported by a Building
E. Baek, H. Choi, J. Oh and S. Lee

13:20-14:30 *Lunch*

14:30-15:10 ▼ Keynote 2:

Displacement-Based Seismic Design of Non-Structural Elements
Prof. Andre Filiatrault

15:15-16:55 Parallel Sessions:
Session 1C: Seismic Performance of Architectural Elements (Room: Auditorium)

1. Infills with sliding joints to limit the post-earthquake damage: role and design of openings
V. Bolis and M. Preti
2. Economic and technical advantages of an innovative infill solution in the seismic response of RC buildings
A. Rossi, P. Morandi, R.R. Milanesi and G. Magenes
3. Seismic behaviour of lightweight steel drywall partitions: Preliminarily fragility analysis based on available data
S. Shakeel, B. Bucciero, L. Fiorino and R. Landolfo

4. A dynamic test based procedure for estimating the stiffening contribution of infill masonry walls on the dynamic behaviour of frame buildings
E. Speranza, V. Nicoletti, S. Carbonari and F. Gara
5. Seismic Behaviour of Lightly Reinforced Concrete Slit Walls as Infills in Reinforced Concrete Frames
Y. Feng, C. Zhang, P. Zhang, Y. Xiong, Y. Gao, X. Wu, S. Zhang and Z. Liu

Session 2C: Seismic Performance of Building Utility and Contents (Room: Music Room)

1. Seismic Fragility Curves of Steel Storage Pallet Racks
G. Gabbianelli, F. Cavalieri and R. Nascimbene
2. Performance assessment of aluminium alloy-glass curtain wall systems under wind and seismic actions
A. Formisano and G. Vaiano
3. The role of details for seismic performance of a full scale glass façade
C. Aiello, N. Caterino, A. Bonati and A. Occhiuzzi
4. Streamlining the Test Methods for Seismic Verification of Façade Anchors
M. Roik and C. Piesker
5. The seismic behaviour of a kit for connection of precast concrete façade elements to concrete structures
A. Bonati, S. Cattaneo, O. Coppola and A. Occhiuzzi

Session 5: Seismic Loss Evaluation of Non-Structural Elements (Room: Library)

1. Empirical Evidences about Economic Consequences for Non-Structural Elements from 2012 Emilia Earthquake
L. Rossi and C. Casari
2. Seismic Damages of a Hotel Lobby with Steel Space Frame Structure in the 2017 Jiuzhaigou Ms.7.0 Earthquake
Y. Liu, J. Dai, Y. Yang and W. Tang
3. Retrofit vs. Repair: Economic Benefits and Costs of Seismic Retrofit of Non-Structural Components
P. Steneker, A. Filiatrault, L. Wiebe and D. Konstantinidis
4. Cost/performance evaluation of traditional and low-damage structural & non-structural building configurations
S. Bianchi, J. Ciurlanti and S. Pampanin
5. SNEM: a method to estimate seismic risk in the workplace in accordance with the Italian safety code
E. Casagrande

17:00-17:30 *Coffee Break*

18:00-19:30 **EUCENTRE 6D Laboratory Visit**

19:30-21:30 **Social Activity**



May 23, 2019

 09:00-09:15 **Presentation International SPONSE Association**

 09:15-09:55 ▼ **Keynote 3:**

 Seismic Assessment of Non-Structural Elements: EAL Evaluation and BIM Role
Prof. Edoardo Cosenza

 10:00-11:00 **Parallel Sessions:**
Session 1D - Seismic Performance of Architectural Elements (Room: Auditorium)

1. In-plane Shear Force-Displacement Modelling of Steel Trapezoidal Sheeting
G. Cantisani and G. Della Corte
2. Experimental investigation on the seismic performance of LWS drywall architectural non-structural elements
T. Pali, S. Shakeel and R. Landolfo
3. Seismic behaviour of a bracing system for LWS suspended ceilings: Preliminary experimental evaluation through cyclic tests
L. Fiorino, T. Pali and R. Landolfo

Session 4A - Seismic Demand on Non-Structural Elements (Room: Music Room)

1. Estimating consistent relative displacement and absolute acceleration floor response spectra in elastic buildings
R.J. Merino, D. Perrone and A. Filiatrault
2. Correlation among Seismic Floor Response Spectral Ordinates
A. Lucchini, P. Franchin and F. Mollaioli
3. Floor Acceleration Demand on Steel Moment Resisting Frame Buildings Retrofitted with Linear and Nonlinear Viscous Dampers
B. Chalarca, D. Perrone and A. Filiatrault

 11:00-11:30 *Coffee Break*

 11:30-12:30 **Parallel Sessions:**
Session 1E - Seismic Performance of Architectural Elements (Room: Auditorium)

1. Influence of Architectural Non-Structural Components on Response of a CFS Building under Seismic Dynamic Loading Conditions
A. Campiche
2. Shake Table Tests of Multiple Non-Structural Elements in a Low - Damage Structural Steel Building
R.P. Dhakal, M. Rashid, J. Bhatta, T.J. Sullivan, G.A. MacRae, G.C. Clifton, L. Jia and P. Xiang
3. Seismic Performance of Suspended Ceilings Attached to Large-Span Spatial Structures
Y. Zhao and Y. Lu

Session 4B - Seismic Demand on Non-Structural Elements (Room: Music Room)

1. A building-specific bi-directional dynamic loading protocol for experiments of non-structural components
Z. Qu, Y. Cao and X. Ji
2. ICC-ES AC156 protocol vs real records: seismic response of freestanding components
D. D'Angela, G. Magliulo and E. Cosenza
3. Performance of Non-Structural Components in Buildings with Controlled Rocking Steel Braced Frames and Buckling Restrained Braced Frames
N. Buccella, L. Wiebe, D. Konstantinidis and T. Steele

 12:45-13:00 **Closing Ceremony**





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The Fourth International Workshop on Seismic Performance of Non-Structural Elements (SPONSE) will take place in Pavia (Italy) on the 22th and 23rd May, 2019. The Workshop is organized under the auspices of the European Centre for Training and Research in Earthquake Engineering (EUCENTRE), the School for Advanced Studies IUSS Pavia and the SPONSE Association.

EUCENTRE Foundation

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