

SERA WP27/JRA5: Innovative testing methodologies for component/system resilience

Oreste S. Bursi

¹University of Trento, Department of Civil, Environmental and Mechanical Engineering (DICAM),
Trento, Italy.
e-mail: oreste.bursi@unitn.it

ABSTRACT

Along with the drive to follow and exploit the developments both in the area of numerical modelling of non-linear systems and the area of advanced testing of components/systems using hybrid (numerical/physical) dynamic substructuring simulations (HDS), the Joint Research Activity #5 (JRA-5) in the European project SERA - Seismology and Earthquake Engineering Research Infrastructure Alliance for Europe- is pursuing the following objectives:

- reduce the computational burden of complex hybrid non-linear systems and provide additional significance to HDS both in civil engineering and mechanical engineering systems by order reduction, quantification of epistemic uncertainties and use of simple non-linear models, e.g. the Bouc-Wen model, etc.;

- compare the performances of online, i.e. the HDS method, and offline methods like the impulse-based substructuring (IBS) and the Lagrange multiplier frequency-based substructuring (LM-FBS);

- study testing equipment able to properly impose complex loading on innovative isolation/dissipation devices made of fiber-reinforced rubber, shape-memory alloys (SMAs), etc. The equipment should be also able to control temperature effects, rate effects and allows for testing of new metamaterials-based devices;

- conceptualise the smart city research, with the design and development for seismic and other natural hazard actions, like tsunamis, etc. Thus, pilot and advanced development studies of the integration of dynamic substructuring/hybrid testing in smart/seismic-prone cities will be carried out. This will also include monitored data of the observational systems, present in the European Plate Observing System (EPOS).

Main research activities and achievements are summarized in the talk.