**Session ID:** SDM-7

**Title**
NONLINEAR METHODS OF ANALYSIS IN SEISMIC ENGINEERING

**Convenors**
E.M. Marino [1], L.N. Lowes [2], C.-L. Lee [3]

**Description**
Prediction of the response of structures subjected to earthquake is a crucial step of the process that leads to assessment of their performance or design of their members. Despite these structures are excited in the nonlinear range of behavior, seismic codes allowed the use of nonlinear methods of analysis (nonlinear static method and nonlinear time-history analysis) only in recent past. Further, they provide prescriptions on these methods that are incomplete and ambiguous. In this framework, engineers feel the need of Nonlinear Methods of Analysis (NMAs) and claim provisions for their reliable application. Indeed, methods based on linear analysis are effective only to predict the response of structures with predetermined collapse mechanism. This is the case of the design of new conventional structures, which today represents a minority in the domain of problems a seismic engineer may be called to solve. The explicit prediction of the nonlinear response is recommended in other cases; e.g., seismic assessment of existing structures, design of seismic upgrading interventions and design of innovative structures. The availability of powerful computers makes possible the extensive use of NMAs. Nevertheless, only a deep knowledge of their strengths and weaknesses can allow users to fully exploit their potential and avoids the misleading feeling that they can always capture the real seismic response.

Much work has been done in this direction in Italy by the ReLUIS consortium, which led the first convenor to propose this technical session. The session will collect contributions on application of NMAs in the field of seismic engineering. Methods and effectiveness will be investigated in solving problems related to both seismic assessment and seismic design of structures. Different NMAs could be compared by parametrical investigations or application to case studies to establish a hierarchy based on their effectiveness/complexity and clear provisions to be included in codes.

**Invited Speakers**
B. Belletti [4], R. Bento [5], G. Lomiento [6], M. Poursha [7], J.C. Reyes [8], E. Spacone [9], G. Uva [10], R. Goel [11]

**Affiliations**
[1] University of Catania, Catania, Italy, [2] University of Washington, Washington, USA, [3] University of Canterbury, Christchurch, New Zealand, [4] University of Parma, Parma, Italy, [5] Instituto Superior Técnico | University of Lisboa, Lisbon, Portugal, [6] California State Polytechnic University, Pomona, USA, [7] Sahand University of Technology, Tabriz, Iran, ISLAMIC REP, [8] Universidad de los Andes, Bogotà, Colombia, [9] University of Chieti-Pescara, Peschara, Italy, [10] Polytechnic University of Bari, Bari, Italy, [11] University of California, Merced, USA