



**POLITECNICO**  
MILANO 1863

**SEMINAR ANNOUNCEMENT**

Room Beltrami, Building 5, ground floor, Leonardo Campus  
Department of Civil and Environmental Engineering

21<sup>st</sup> March 2018 – 11:30-12:30

**On the design of new and existing structures taking  
advantage of nonlinear soil-structure interaction**

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**Abstract**

According to current seismic codes, the foundation soil is not allowed to fully mobilize its strength, and plastic deformation is restricted to above-ground structural members. Capacity design is applied to the foundation guiding failure to the superstructure, thus prohibiting mobilization of soil bearing capacity. However, a significant body of evidence suggests that allowing strongly nonlinear foundation response may be advantageous. The lecture will introduce an alternative seismic design philosophy termed rocking isolation, in which soil yielding is used as a “fuse”. According to such a scheme, the foundation is intentionally under-designed to uplift and fully mobilize its bearing capacity, limiting the inertia transmitted onto the superstructure. To unravel the effectiveness of rocking isolation, a bridge pier is used as an illustrative example. A conventionally designed system is compared to a rocking-isolated alternative. Their seismic performance is explored analytically, through nonlinear finite element analyses, and experimentally, through shaking table and centrifuge model testing. A similar comparison is performed for an existing structure. Finally, novel concepts are introduced, aiming to minimize permanent rotations and settlements.

Reference: **Prof. Roberto Paolucci** ([roberto.paolucci@polimi.it](mailto:roberto.paolucci@polimi.it))

**Bio-sketch**

**Prof. Ioannis Anastasopoulos** has been Full Professor of Geotechnical Engineering at ETH Zurich since 2016. He specializes in geotechnical earthquake engineering and soil-structure interaction, combining numerical with experimental methods. He holds a PhD from the National Technical University of Athens (NTUA), an MSc from Purdue University, and a Civil Engineering Diploma from NTUA. His research interests include the development of innovative seismic hazard mitigation techniques, faulting and its effects on infrastructure, site effects and slope stabilization, railway systems and vehicle-track interaction, seismic response of monuments, offshore geotechnics, and earthquake crisis management systems. He has been involved as a consultant in a variety of projects of significance in Europe, the US and the Middle East. His consulting work ranges from special seismic design of bridges, buildings, retaining walls, metro stations and tunnels, to harbour quay walls, and special design against faulting-induced deformation applying the methods he has developed. He currently serves as Associate Editor of *Frontiers in Earthquake Engineering*, and has sat on the panel of *Géotechnique* and of the *ICE Geotechnical Engineering Journal*. He is the inaugural recipient of the Young Researcher Award of the ISSMGE in Geotechnical Earthquake Engineering, and winner of the 2012 Shamsher Prakash Research Award.

