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FLORENCE - ITALY
16th International
Conference on
Wind Engineering



New frontiers in modeling nonlinear dynamics of wind-structure interactions

Summary outline:

The field of wind engineering has evolved rapidly in the last decades to fill in important gaps in knowledge but also to cope with new design and technical challenges associated with longer spans in bridges and increasing heights in buildings and towers. The quest for longer spans and new heights comes with higher structural compliance and lighter inherent damping. This combination of factors has made the nonlinear wind-structure aeroelastic interaction more meaningful and pushed the modelling efforts to capture these effects both in the structural systems and in the flow field. New design paradigms are also emerging out of the wide investigations into the nonlinear aerodynamic response regime. This context has promoted new exciting developments at the intersection of nonlinear dynamics, wind engineering, structural dynamics, aerospace engineering, and applied mathematics. This symposium aims at gathering researchers from different multi-disciplinary fields to discuss new ideas and findings involving analytical, numerical, experimental studies into nonlinear phenomena in bridges and generally slender structures. This may include research covering a variety of nonlinear dynamics lab or full-field experiments, signal processing, analysis of data to characterize nonlinear systems, identification of nonlinear dynamic models, experimental verification of nonlinear control methodologies including absorbers and metamaterials (liquid dampers, nonlinear absorbers, etc.) and the comparison of experimental data to the underlying mathematical models. Potential topical studies may include, but are not limited to: 1) Nonlinear dynamic modelling of slender structures under wind excitations (PDEs, reduced-order modelling), 2) Experimentally observed nonlinear dynamic phenomena, 3) Control of nonlinear aeroelastic phenomena (nonlinear vibration absorbers, metamaterial design concepts).

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