CIVIL AND ENVIRONMENTAL ENGINEERING

Ateneo - Mechanics of materials

Funded By	Politecnico di TORINO [P.iva/CF:00518460019]
Supervisor	LACIDOGNA GIUSEPPE - giuseppe.lacidogna@polito.it
Contact	LACIDOGNA GIUSEPPE - giuseppe.lacidogna@polito.it MARANO GIUSEPPE CARLO - giuseppe.marano@polito.it
Context of the research activity	Subject of the research will be the phenomena of Instability in the mechanical behaviour of materials and structures. As regards the materials, the phenomena of brittle or ductile fracture will be considered, whereas, as regards the slender structures, the phenomenon of buckling in the static as well as in the dynamic regime.
Objectives	The material behaviour will be investigated in particular for what concerns snap-through and snap-back instabilities and their implications onto energy emissions in the form of pressure waves, electromagnetic radiation, and sub-atomic particles. As a consequence, different practical problems can be faced, as, for instance, those of seismic precursors, heat generation, and protein folding. Also the sub-critical crack growth will be considered under cyclic loading. Scaling effects on fatigue limit and fatigue threshold can be analyzed and justified through Fractal Geometry. Special importance is also given to the diagnosis and monitoring techniques, and in particular to an advanced acoustic emission approach. In the case of long-span structures, the interaction of buckling with snap-through (in shallow roofing domes), and with resonance (flutter in suspension bridges) will be studied in an innovative way. In the case of high-rise buildings, the computing code for the static and dynamic analyses will be extended to a global buckling analysis.
Skills and competencies for the development of the activity	structural mechanics, building design, data analysis