Università di Genova

DICCA DIPARTIMENTO DI INGEGNERIA CIVILE, CHIMICA E AMBIENTALE

DICCA SEMINAR SERIES 2022

ELENI CHATZI - ETH, Dept Civil Environmental and Geomatic Engineering

"A hybrid approach to condition monitoring relying on fusion of data and models"

The monitoring of the condition of structural systems operating under diverse dynamic loads involves the tasks of simulation (forward engineering), identification (inverse engineering) and maintenance/control actions. The efficient and successful implementation of these tasks is however non-trivial, due to the ever-changing nature of these systems, the variability in their interactive environments, and the polymorphic uncertainties involved. Structural Health Monitoring (SHM) attempts to tackle these challenges by exploiting information stemming from sensor networks. SHM comprises a hierarchy across levels of increasing complexity aiming to i) detect damage, ii) localize and iii) quantify damage, and iv) finally offer a prognosis over the system's residual life. When considering higher levels in this hierarchy, including in-depth damage assessment and even performance prognosis, purely data-driven methods are found to be lacking. For higher-level SHM tasks, or for furnishing a digital twin of a monitored structure, it is necessary to integrate the knowledge stemming from physics-based representations that rely on the underlying mechanics. This talk discusses implementation of such a hybrid approach to SHM for tackling the aforementioned challenges with example applications on diverse infrastructure components, including civil, aerospace and wind energy structures.

Short bio

Eleni Chatzi received her PhD (2010) from the Department of Civil Engineering and Engineering Mechanics at Columbia University, New York. In 2010, she proceeded to obtain an Assistant Professor position at ETH Zurich, where she currently serves as Associate Professor and Chair of Structural Mechanics and Monitoring at the Department of Civil, Environmental and Geomatic Engineering. Her research interests include the fields of Structural Health Monitoring (SHM) and structural dynamics, nonlinear system identification, and intelligent life-cycle assessment for engineered systems. She is an author of over 300 papers in peer-reviewed journals and conference proceedings, and further serves as an editor for international journals in the domains of Dynamics and SHM. She is currently leading the ERC Starting Grant WINDMIL on the topic of "Smart Monitoring, Inspection and Life-Cycle Assessment of Wind Turbines". Her work in the domain of self-aware infrastructure was recognized with the 2020 Walter L. Huber Research prize, awarded by the American Society of Civil Engineers (ASCE).

01/07/2022 – 11am (CET)
Villa Cambiaso - Salone Nobile, Via Montallegro 1 (GE)
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