



Automated Analysis of Ultrasonic Signals in NDE and SHM via Data-Driven Statistical Methods and Deep Learning

STEFANO MARIANI

Location Teams platform - Campus of Engineering of University of Perugia
 Latitude: 43.118177 Longitude: 12.357942

Timetable September 18th 2020 – 12:00 p.m. (CET)
 Room 1 (CEEPHD Team)

Stefano Mariani

Stefano Mariani is a Research Associate with the Non-Destructive Evaluation Group of the Mechanical Engineering Department of Imperial College London, UK. He obtained his Ph.D. degree from the University of California San Diego, USA, and his M.S. and B.S. degrees from the University of Perugia, Italy. His research interests include developing methods for guided wave testing of structures and for the analysis of ultrasonic signals in structural health monitoring mode.



Abstract

One of the enablers of the fourth industrial revolution will be the installation of a vast number of sensors in robots, vehicles and structures that can monitor their health conditions. Ultrasound possesses the required sensitivity to detect damage, impacts, corrosion and other anomalies occurring to metallic and composite materials, and possibly of others. However, the complexity of ultrasonic propagation, especially in the guided wave regime, and the ever-increasing volume of acquired data require algorithms that can automatically interpret the signals and either trigger an action or warn a human operator. I believe that a mixture of data-driven "conventional" statistical methods and machine learning algorithms can deliver the framework to accomplish these tasks, though at present there is a lack of successful implementations of machine learning techniques for the automated interpretation of ultrasonic signals in NDE/SHM. In this talk I will present a few methods that I have recently developed towards this goal, including a deep learning algorithm that was obtained by adapting a relatively novel architecture which is setting the state-of-the-art in various tasks of audio processing, and I will conclude with some thoughts on where research efforts are most needed.

