



DIMEAS SEMINAR

A TUTORIAL ON BAYESIAN APPROACH TO NON-LINEAR SYSTEM IDENTIFICATION

SPEAKER



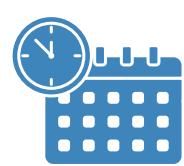
Keith Worden
Sheffield University

Abstract

In the past two decades, it is fair to say that there has been an explosion in the use of machine learning technology or "data-driven" methods, across the whole subject of Engineering; this is no less true of the subdiscipline of structural dynamics. A modern dynamicist needs, at the least, some familiarity with these technologies. This paper attempts to give an overview of some of the main ideas in "data-based" engineering, by focussing on the (comparatively) smaller area of nonlinear dynamics { indeed on nonlinear system identification. A particular viewpoint is adopted, based on modern Bayesian methods of regression. Considerable attention is paid here to the desirability of combining measured data with physical insight when modelling dynamic systems and structures. Although this view naturally begins with the idea of "grey-box" models, this generalises into the emerging subject of physics-informed machine learning. Although this tutorial necessarily focusses down on a narrow application context, the many references allow the curious reader to explore further a field.

BIO

Professor Keith Worden began academic life as a theoretical physicist, with a degree from York University and a PhD in Mechanical Engineering from Heriot-Watt University eventually followed. A period of research at Manchester University led to an appointment at the University of Sheffield in 1995, where he has happily remained since. Keith's research is concerned with applications of advanced signal processing and machine learning methods to structural dynamics. The primary application is to aerospace and civil infrastructure, including offshore energy systems.



Tuesday, Feb. 10th 2026
11 a.m.



Meeting room, III floor,
DIMEAS – Politecnico di Torino