DELFT UNIVERSITY OF TECHNOLOGY

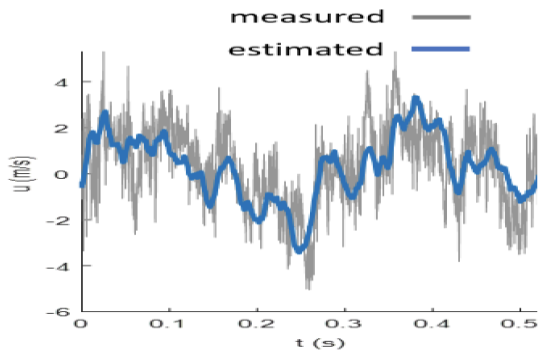
DIP. DI INGEGNERIA INDUSTRIALE

Modern analysis tools for studying the coherent dynamics in spatial/temporal data-set

Lecturer: Prof. Woutijn Baars (Delft University of Technology)

Room 1.5 Via Montaspro 97 Forlì

(and MS Teams virtual room)



PROGRAM

April 4 and 12 (6 hours)

Lecture 1: Tuesday, April 4th (3h) 3 pm -6 pm - **Link to MS Teams**
Lecture 2: Wednesday, April 12th (3h) 3 pm -6 pm - **Link to MS Teams**

ABSTRACT

The aim of this doctoral seminar series is to develop an understanding of several modern analysis tools for studying large-scale dynamics in datasets of unsteady systems. By learning about how to extract patterns from data, doctoral students will develop an appreciation for methods that can aid in learning about the rich physics embedded in spatial/temporal data of different levels of fidelity. By focusing on the methodologies and interpretation of the results, the seminar is suitable for researchers across different engineering disciplines and will serve students working in both the numerical and experimental branches. A recap of elements of statistical mechanics and random data will form the basis of more advanced techniques. The former will cover input/output system identification techniques, spectral methods, and data-driven stochastic estimation tools. Decomposition techniques (e.g. various forms of POD) and dynamical systems modelling will be discussed, as well as aspects of non-stationary data (e.g. transient time-series, requiring wavelet transforms). The sessions will include illustrative research applications in fluid mechanics and acoustics, while the material is also directly applicable to other research fields.