

AEROSPACE ENGINEERING

DIMEAS - Scientific machine learning and real-time digital twins for chaotic flows

Funded By	Dipartimento DIMEAS
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Contact	
Context of the research activity	Scientific machine learning, turbulent flows, optimisation
Objectives	In this project, the student will develop computational and theoretical methods to combine physical knowledge with machine learning. The goal is to propose models that can adapt in real-time when stream of data comes from data. This involves developing methods that are physics-aware, real-time, can handle model uncertainties (Bayesian), and tackle turbulent flows and spatiotemporal chaos. The approach is that of dynamical system and control. The student will develop the computational methods from prototypical turbulent testcases, and then they will scale up the method to tackle higher dimensional systems and experimental data from wind tunnel. Applications will be in turbulent and chaotic dynamical systems, with a focus on extreme dynamics.
Skills and competencies for the development of the activity	Fluid mechanics, programming, optimisation