ID de Contribution: **21** Type: **Non spécifié**

Machine-learning and equations-informed tools for generation and augmentation of turbulent data.

jeudi 30 novembre 2023 14:00 (35 minutes)

Our ability to collect data is rapidly increasing thanks to computational power and the unprecedented diversity of sensors. But how good are we at extracting, reconstructing, and understanding information from them? We present a short overview of some recent advancements for data-assimilation and modelling of turbulent multi-scale flows using both data-driven and equations-informed tools, starting from sparse and heterogeneous observations of complex fluid systems. Issues connected to validations and benchmarks in the presence of full or partial observability will be discussed. A few examples of data-generation and data- augmentation based on Generative Adversarial Learning, Diffusion Models and Nudging, for Eulerian and Lagrangian turbulence will be quantitatively discussed.

-Synthetic lagrangian turbulence by generative diffusion models
T Li, L Biferale, F Bonaccorso, MA Scarpolini, M Buzzicotti
arXiv preprint arXiv:2307.08529 (2023).
- Multi-scale reconstruction of turbulent rotating flows with proper orthogonal decomposition and generative adversarial networks
T Li, M Buzzicotti, L Biferale, F Bonaccorso, S Chen, M Wan
Journal of Fluid Mechanics 971, A3 (2023)
-Synchronization to big data: Nudging the Navier-Stokes equations for data assimilation of turbulent flows
PC Di Leoni, A Mazzino, L Biferale Physical Review X 10 (1), 011023 (2020)

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Classification de Session: Controlling uncertainties in generative models

Classification de thématique: Controlling uncertainties in generative models