On the importance of low-dimensional structures for data-driven modeling

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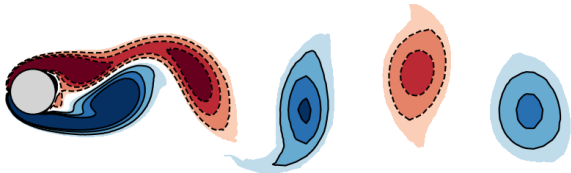
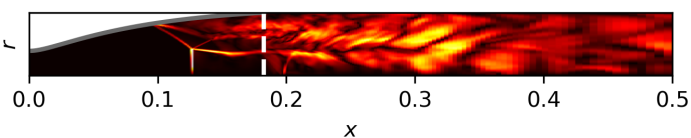
May, 13th 2022

Who am I ?

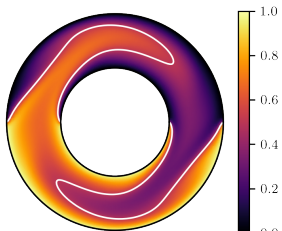
- Maître de Conférences in Fluid Dynamics and Applied Math.
- Machine-learning enthusiast with application to engineering systems.
- Data-efficient models with guarantees of optimality or interpretability.



Aerodynamics

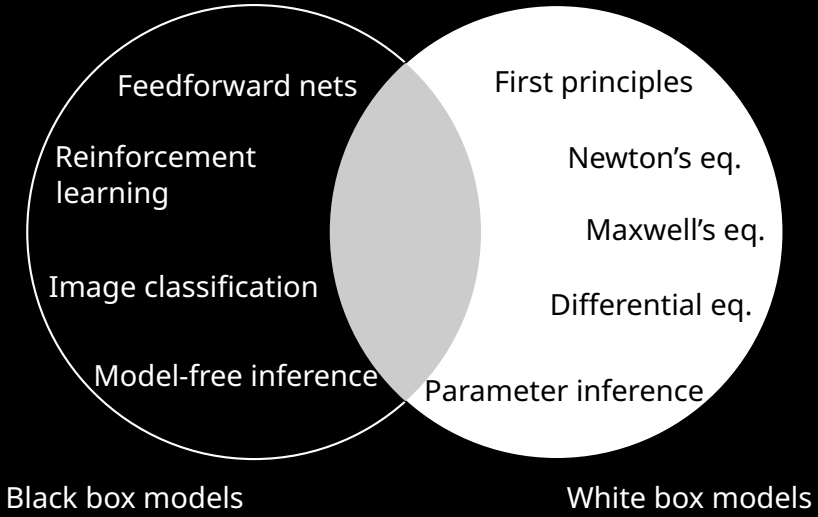


Rocket science



Heat exchange

N. Wiener’s classification



Example: Face recognition

two faces with arrows

Example: Face recognition

overview figure of the SIAM paper

Example: System identification

A brief overview of SVD

Singular value decomposition

$$\boldsymbol{A}\boldsymbol{v}_i = \sigma_i \boldsymbol{u}_i$$
$$\boldsymbol{A}^T\boldsymbol{u}_i = \sigma_i \boldsymbol{v}_i$$

Generalization of the *eigenvalue decomposition* to **non-square matrices** by E. Beltrami (1873) and C. Jordan (1874). The first efficient numerical algorithm was developed by G. Golub *et al.* in the late 1960s.