Labex INTERACTFS (https://labex-interactifs.pprime.fr/)

I. Informations générales :

Employeur de l'intervenant ***Employer***	**UP ENSMA CNRS**
TITRE du cours en français ***French title***	**RÉDUCTION DE MODÈLES POUR LA MÉCANIQUE DES FLUIDES ET LES TRANSFERTS THERMIQUES**
TITRE du cours en anglais ***English title***	**MODEL REDUCTION FOR FLUID MECHANICS AND HEAT TRANSFERS**
Adéquation avec les thèmes du Labex ***Adequacy with Labex Research project topics***	1 - COUPLAGE ENTRE LES MATÉRIAUX ET DES CONDITIONS SPÉCIFIQUES D'ENVIRONNEMENT 2 - FONCTIONNALISATION DES SURFACES 3- FLUIDES ET PHÉNOMÈNES ÉLECTRIQUES AUX INTERFACES
Enseignant ***Teacher***	**Nom :** CORDIER **Prénom :** Laurent **Tel :** 05 49 49 69 22 **Email : Laurent.Cordier@univ-poitiers.fr**

Nb d'heures de cours :	10	ENSMA
Wednesday, November 12nd	17:30 pm to 19:30 pm	B139
Thursday, November 13rd	15:30 pm to 17:30 pm	B139
Wednesday, November 19th	17:30 pm to 19:30 pm	B139
Friday, November 21st	17:30 pm to 19:30 pm	B139
Tuesday, November 25th	17:30 pm to 19:30 pm	B139

II. Description du cours proposé, objectifs et plan

Voir verso.

Model reduction for Fluid Mechanics and Heat Transfers

Course proposal – Labex INTERACTIFS

10 h

Lecturer: Laurent CORDIER (Laurent.Cordier@univ-poitiers.fr) - Directeur de Recherche CNRS – UPR 3346.

Language: This course will be given in English.

With the technical advances in the experimental and numerical domains, researchers are faced with increasingly large amounts of data. It has thus become more necessary than ever, to have methods allowing to extract, if possible in an automatic way, the essential information from a physical point of view in order to understand, predict and if possible control the phenomena of interest. This problem is at the heart of dimensionality reduction. In this course, we will address this problem from a kinematic point of view (extraction of modes according to different criteria) and from a dynamical point of view (construction of reduced-order models allowing to reproduce the dynamics of the system).

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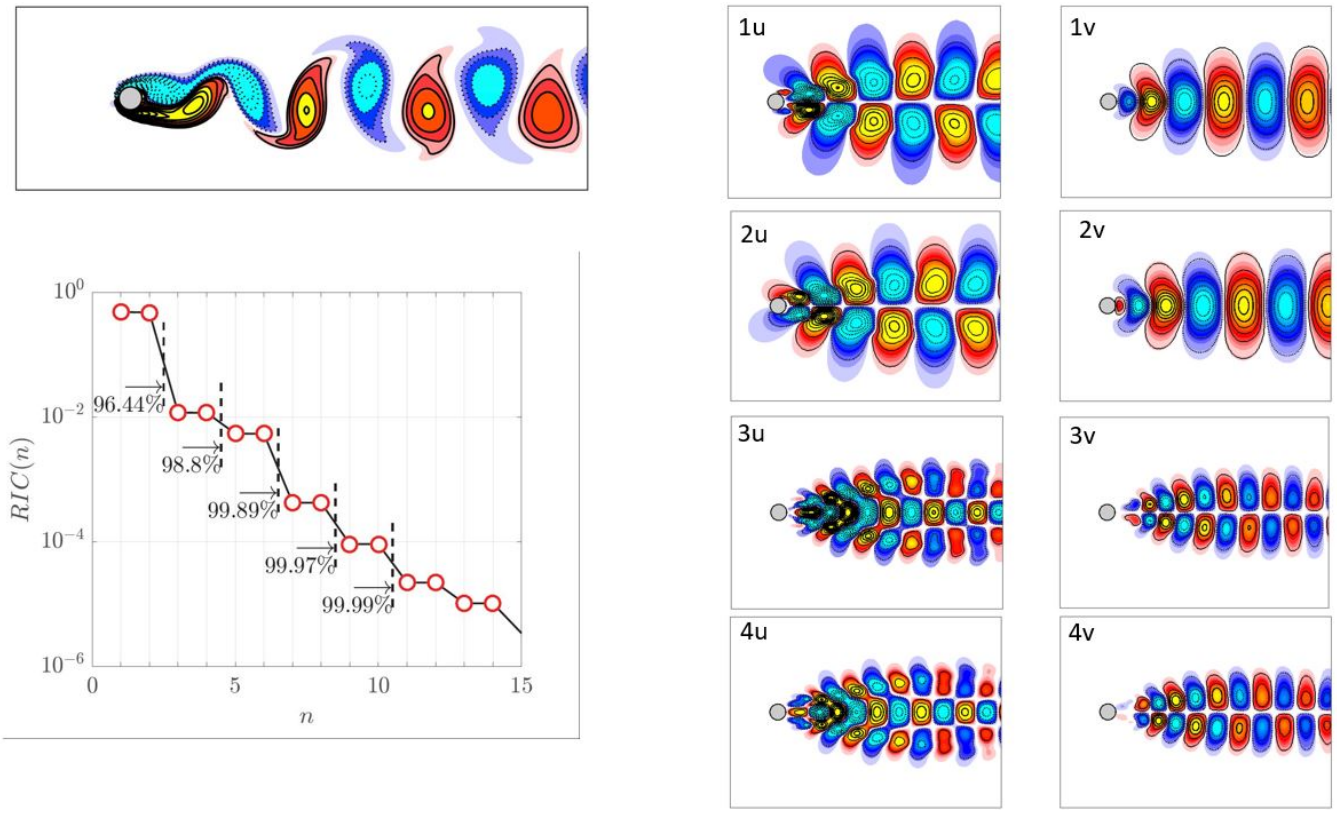
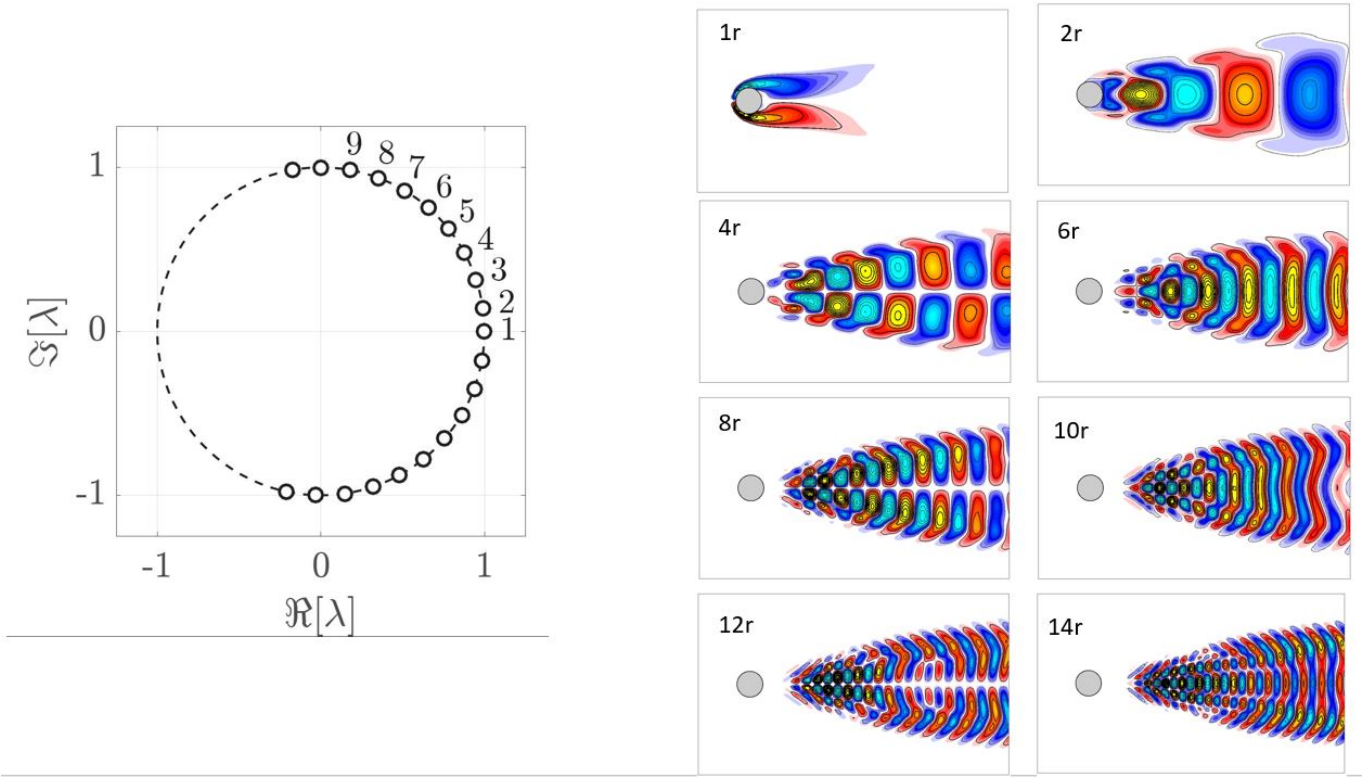
Notions of machine learning will be covered. These methods will be described in more detail in the course "Machine Learning for Physicists".



Model reduction by POD: illustration for a cylinder wake flow.



Model reduction by DMD: illustration for a cylinder wake flow.