

Data Assimilation



ECTS
3 crédits



Hourly volume
36h

Introducing

Objectives

At the end of this module, the student will have understood and will be able to:

(Data Assimilation part)

- write an optimal control problem formulation, both for ODE models and PDE models

- combine at best a PDE model with datasets.

- compute a gradient using the adjoint method.

- set up algorithms of parameters identification, model calibration (3D-Var, 4D-Var etc)

- explain the equivalencies between VDA, BLUE, Kalman filtering and Bayesian approach in the Linear-Quadratic-Gaussian case

- introduce prior probabilistic information via covariances matrix

(Model learning part)

- set up a model learning method from datasets and an a-priori given dictionary.

Both for ODE or (scalar) PDE models.

The student will be able to:

Set up the equations and the complete modeling chain to perform parameters identification / model

calibration / Variational Data Assimilation for PDE models.

Identify the dominant model terms from measurements

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Necessary prerequisites

Basics of: PDE models, differential calculus, optimisation, functional analysis, numerical schemes, Python programming.

Practical info

Location(s)

Toulouse