

# HPC and Uncertainty Treatment - Examples with OpenTURNS and Uranie

Partnership for Advanced Computing in Europe (PRACE)

OpenTURNS Consortium and CEA

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**Les 09/05/2022, 16/05/2022 et 23/05/2022 - 9h30- 12h30 / 14h – 17h, en distanciel**

Lien Inscription : <https://events.prace-ri.eu/event/1287/>

## Day 1 : Methodology of Uncertainty Treatment – Basics of Probability and Statistics

- General Uncertainty Methodology (30') : A. Dutfoy (G. Blondet)
- Probability and Statistics: Basics (45') : G. Blondet (A. Dutfoy)
- General introduction to OpenTURNS and Uranie (2 \* 30') : G. Blondet, JB Blanchard
- Introduction to Python and Jupyter (45'): practical work on distributions manipulations: G. Blondet (J. Pelamatti)

Lunch

- Uncertainty Quantification (45') : JB Blanchard (G. Blondet)
- OpenTURNS – Uranie practical works: sections 1, 2 (1h): JB Blanchard , G. Blondet, (A. Dutfoy)
- Central tendency and Sensitivity analysis (1h): A. Dutfoy (J. Pelamatti)

## Day 2 : Quantification, Propagation and Ranking of Uncertainties

- QCM on Day 1
- Application to OpenTURNS and Uranie (1h): J. Pelamatti, G. Blondet, JB Blanchard
- Estimation of probability of rare events (1h): G. Blondet (J. Pelamatti, JB Blanchard)
- Application to OpenTURNS and Uranie (1h): J. Pelamatti, G. Blondet, JB Blanchard

Lunch

- Distributed computing (1h) : Uranie (15', JB Blanchard), OpenTURNS (15', G. Blondet), Salome et OpenTURNS (30', O. Mircescu)
- Optimisation and Calibration (1h) : JB Blanchard , J. Pelamatti, (G. Blondet)
- Application to OpenTURNS and Uranie (1h): JB Blanchard, J. Pelamatti, G. Blondet

## Day 3 : HPC aspects – Meta model

- QCM on Day 2
- HPC aspects specific to the Uncertainty treatment (1h) : K. Delamotte (J. Pelamatti)
- Introduction to Meta models (validation, over-fitting) – Polynomial chaos expansion, Kriging meta model (2h) : C. Mai, J. Pelamatti

Lunch

- Application to OpenTURNS and Uranie (2h) : J. Pelamatti, C. Mai, G. Blondet, JB. Blanchard
- Discussion / Participants projects