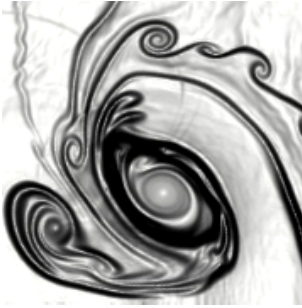


PPSC 2022 Fall

Programmation et Calcul Scientifique Parallèle Programming and Parallel Scientific Computing



Lecturers

Elie Hachem
Aurélien Larcher
Jonathan Viquerat

Schedule

30h Courses + Exercises

Week 46

15. November I/E102
17. November I/E102

Week 47

22. November I/E102
24. November I/E102

Week 48

29. November I/E102
01. December I/E102



Objectives

The course provides an introduction to C++ programming and algorithms with a focus on scientific computing for solving PDEs.

An overview of the C++ language is provided : specification, arithmetics, memory management, object-oriented design for component-based software, and advanced topics using templates.

Distributed and shared-memory parallel computing are then approached with exercises related to numerical linear algebra and solution methods for Partial Differential Equations.

Course content

1. Implementation of numerical algorithms
 - Environment (UNIX/Linux) and standards
 - Integer and Floating-point arithmetics
 - Object-Oriented concepts in C++
 - Template and meta-programming in C++
 - Advanced numerics with the STL
2. Parallel scientific computing
 - Parallel computing architectures
 - Distributed programming models (MPI)
 - Shared memory models (OpenMP)
 - Performance for numerical linear algebra
 - Applications to finite element/finite difference methods

Evaluation

The course is evaluated based on the participation during programming labs and on the final project consisting of the implementation in C++ of a parallel solver for a given PDE :

Lab exercises	25%
Final project	75%