Summary
In this course we will introduce and study numerical integrators for multi-scale (or stiff) differential equations and dynamical systems with special geometric structures (symplecticity, reversibility, first integrals, etc.). These numerical methods are important for many applications.

Content
- Numerical integration of multi-scale or stiff differential equations.
- Numerical methods preserving geometric structures of dynamical systems (Hamiltonian systems, reversible systems, systems with first integrals, etc.

Learning Prerequisites

Recommended courses
Analysis, Numerical Analysis

Learning Outcomes
By the end of the course, the student must be able to:
- Identify stiff and Hamiltonian differential equations
- Analyze geometric and stability properties of differential equations
- Choose an appropriate method for the solution of stiff or Hamiltonian differential equations
- Analyze geometric and stability properties of numerical methods
- Implement numerical methods for solving stiff or Hamiltonian differential equations

Teaching methods
Ex cathedra lecture, exercises in classroom

Assessment methods
Written

Supervision
Office hours       Yes
Resources

Bibliography

Ressources en bibliothèque
• Geometric Numerical Integration / Hairer
• Solving Ordinary Differential Equations II / Hairer

Websites
• http://anmc.epfl.ch/Numerical.html