

Ordinary Differential Equations and Series

Introducing

Description

1. Review and Additions on First- and Second-Order Scalar ODEs: Linear cases, Equations of Mechanics, Riccati Equations.
2. Qualitative Aspects of ODEs: Maximal and global solutions, Existence and Uniqueness Theorems, Equations with separable variables, Phase portraits.
3. Numerical Aspects of ODEs: Euler schemes, Trapezoidal method, Runge-Kutta schemes, Error estimation.
4. Function Series: Review of function sequences and numerical series, Modes of convergence and summation properties, Power series applications to ODEs.
5. Linear Differential Systems: First-order systems with constant coefficients, Matrix exponential, Practical resolution, Phase portraits in the plane, Stability of equilibria.
6. Laplace Transform: Integral definition, Computational properties, Applications to ODEs.

Objectives

This module introduces the mathematical framework of Ordinary Differential Equations (ODEs) and provides methods for qualitative and quantitative analysis. Students are expected to identify the type of an ODE and apply appropriate techniques to solve or characterize its solutions.

Necessary prerequisites

Mathematics courses from the first year and UE I2ICMT31.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse