Numerical methods for
Ordinary Differential Equations

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Timetable:

Course requirements: it is advisable to have attended a basic course in Numerical Analysis.

Examination and grading: Written exam.

SSD: MAT/08 Numerical Analysis

Aim: We present basic numerical methods for initial value problems in ordinary differential equations and we analyse their convergence properties.

Course contents:

Existence and uniqueness of the solution and continuous dependence on the data for the initial value problem \( y'(x) = f(x, y(x)), y(x_0) = y_0. \)

Classical Lipschitz constant and right hand side Lipschitz constant.

General one-step methods; explicit and implicit Runge-Kutta methods.

Definition of local truncation and discretization error for one-step methods and definition of consistency of order \( p \).


Variable stepsize implementation. Embedded pairs of methods of Runge-Kutta-Fehlberg type.

References:

- Lecture notes by the professors.