

BIWO-04: Numerical Methods (Prof. Reuter)

Contents

Introduction to Numerical Analysis

- types and stability of algorithm
- condition of problems

Programming with Fortran 90/95

- structur of program
- basic elements
- declaration of variables
- arithmetic and logical operators
- conditional statements and loops
- input and output

Linear algebra

- vector calculus, matrix calculus
- aystems of linear equations
- apecific eigenvalue problem
- generalized eigenvalue problem

Systems of non-linear equations

- Bisection method, secant method, regula falsi method
- Newton's method

Extremum problems

Numerical integration

- Quadrature rules based on interpolating functions
- Monte Carlo integration (simulation)

Approximation

- function approximation
- approximation of discrete data
- polynomial interpolation vs. spline interpolation
- interpolation vs. regression analysis

Computer graphics

- coordinate transformation
- projection

recommended literature

R.Kress: Numerical Analysis, Springer, New York Berlin Heidelberg, 1998

D.V.Griffiths, I.M.Smith: Numerical methods for engineers - a programming approach, Blackwell Scientific, London, 1991