Curriculum MAT 260 (2018)

Numeric Algoritms II.

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Lecture Structure

1 Computer Arithmetic

- Floating-point arithmetic.
- Some notions from functional analysis.
- Condition of a problem.

2 Iterative solvers for the linear systems.

- Jacobi, Gauss-Seidel, SOR.
- The (Conjugate) Gradient Method.

3 Solvers for the nonlinear systems.

- Fix point methods (Picard, L-scheme).
- Newton method.

4 Approximations of functions.

- Gauss and Gauss-Lobato quadratures.
- Least-square method.
- Fourier series.

5 Numerical methods for ODE's.

- One step methods.
- Multistep methods.
- Consistency, (zero and absolute)-stability, convergence.

6 Eigenvalues and Eigenvectors.

7 Numerical methods for PDE's.

- Finite differences.

I will mainly use the books [7, 4] for the lectures.

References

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[4] P. Knabner and L. Angermann, *Numerical methods for elliptic and parabolic partial differential eqations*, Springer-Verlag, 2003 (ISBN 0-387-95449-X).

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[9] F. A. Radu, *Mixed finite element discretization of Richards' equation: error analysis and application to realistic infiltration problems*, PhD Thesis, University of Erlangen, Germany (2004).

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