

PhD Course on stiff problems - Nicola Guglielmi

6 lectures: 9, 10 , 11, 16, 17 and 18 January at 3pm at room HPC, ground floor

Topics

1. Examples of Stiff Equations; Chemical Reaction Systems; Electrical Circuits; Diffusion
2. Linear and nonlinear stability of Runge-Kutta methods for ODEs.
3. Collocation methods for stiff problems.
4. Implementation of Implicit Runge-Kutta Methods. Reformulation of the Nonlinear System. Simplified Newton Iterations. The Linear System. Step Size Selection.
5. Implicit Differential Equations (DAEs).

References

- [1] E. Hairer, S. Nørsett and G. Wanner, *Solving ordinary differential equations. I. Nonstiff problems*. Second edition. Springer Series in Computational Mathematics, 8. Springer-Verlag, Berlin, 1993.
- [2] E. Hairer and G. Wanner, *Solving ordinary differential equations. II. Stiff and differential-algebraic problems*. Second edition. Springer Series in Computational Mathematics, 14. Springer-Verlag, Berlin, 1996.