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Numerical Methods for Partial Differential Equations

Paola Gervasio

DICATAM, Università degli Studi di Brescia (Italy)

paola-gervasio.unibs.it/NMPDE

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Summary

1. Introduction to PDEs.
2. Elliptic PDEs: weak form, Galerkin approximation.
3. Finite Elements approximation of 1D and 2D elliptic PDEs.
4. Spectral Element Methods (a brief introduction).
5. Parabolic PDEs: weak form, approximation by FEM in space and FD in time.
6. Advection dominated elliptic equations: artificial diffusion and stabilization techniques.
7. MATLAB laboratory.

Teaching material

- Slides of some lessons
- Slides of the laboratory lessons
- A MATLAB library for 1d-FEM
- MATLAB scripts written during the laboratory lessons

On the web-page of the course:
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Bibliography

1. A. Quarteroni, *Numerical Models for Differential Problems*. Spinger, 2017 (free download for Unibs users).
2. A. Quarteroni, F. Saleri, P. Gervasio, *Scientific Computing.* Springer, 2014.
3. A. Quarteroni, F. Saleri, P. Gervasio, *Calcolo Scientifico*. Springer, 2018 (free download for Unibs users).

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