Matrix functions: computation and applications to complex networks analysis and large scale problems.

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April 10–13, 2017

The aim of the course is to introduce basic concepts related to the computation of matrix functions and their use in the analysis of complex networks. Half of the course will be dedicated to the implementation of some algorithms by using the MATLAB software.

Outline of the course

- Linear algebra: eigenvalue decomposition, Jordan decomposition, singular value decomposition;
- Introduction to matrix functions and bilinear/quadratic forms: orthogonal polynomials, Lanczos algorithms, quadrature formulas;
- Introduction to complex networks theory: graphs, centrality/communicability indices, network indices;
- Use of the MATLAB software.

References

[1] G. H. Golub and G. Meurant, *Matrices, Moments and Quadrature with Applications*, Princeton University Press, Princeton, 2010.

[2] N. J. Higham, *Functions of matrices: theory and computation*, SIAM, 2008.

[3] W. Gautschi, *Orthogonal polynomials: computation and approximation*, Oxford University Press, 2004.