Generalized Locally Toeplitz Sequences:
A Spectral Analysis Tool for
Discretized Differential Equations

Description of the Course

The theory of Generalized Locally Toeplitz (GLT) sequences was developed in order to solve a specific application problem, namely the problem of computing/analyzing the spectral distribution of matrices arising from the numerical discretization of Differential Equations (DEs). A final goal of this spectral analysis is the design of efficient numerical methods for computing the related numerical solutions. The purpose of this course is to introduce the reader to the theory of GLT sequences and to present some of its applications to the computation of the spectral distribution of DE discretization matrices. The course will mainly focus on the latter applications, whereas the theory will be presented in a self-contained tool-kit fashion, without entering into technical details.

Program

The course will require about 20 hours and will be held in the period 01/04—09/06/2024.

References

[1] Garoni C., Serra-Capizzano S., *Generalized Locally Toeplitz Sequences: Theory and Applications (Volume I)*, Springer, Cham, 2017.

[2] Garoni C., Serra-Capizzano S., *Generalized Locally Toeplitz Sequences: Theory and Applications (Volume II)*, Springer, Cham, 2018.

[3] Garoni C., Serra-Capizzano S., *Generalized locally Toeplitz sequences: a spectral analysis tool for discretized differential equations*, Lecture Notes in Mathematics 2219 (2018) 161—236.