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Global space-time low-rank methods for the time-dependent Schrödinger equations

Wednesday, 3 April 2024 14:30 (1 hour)

The aim of this talk is to present novel global space-time methods for the approximation of the time-dependent Schrödinger equation, using Kato theory. The latter can be used in conjunction with low-rank tensor formats (such as Tensor Trains for instance) to derive new variational principles to compute dynamical low-rank approximations of the solution, which are different from the Dirac-Frenkel principle. One significant advantage of this new variational formulation is that the existence of a dynamical low-rank approximation for any finite-time horizon can be proved, whereas dynamical low-rank approximations constructed with the Dirac-Frenkel principle can usually be porved to exist only locally in time. Illustrative numerical results will be presented to highlight the differences between the dynamical low-rank approximations obtained with these different approaches.

This is joint work with Clément Guillot and Mi-Song Dupuy.

Presenter: EHRLACHER, Virginie (Ecole des Ponts ParisTech)