

Dynamical low-rank methods for high-dimensional collisional kinetic equations

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Kinetic equations describe the nonequilibrium dynamics of a complex system using a probability density function. Despite of their important role in multiscale modeling to bridge microscopic and macroscopic scales, numerically solving kinetic equations is computationally demanding as they lie in the six-dimensional phase space. Dynamical low-rank method is a dimension-reduction technique that has been recently applied to kinetic theory, yet most of the endeavor is devoted to linear or collisionless problems. In this talk, we introduce efficient dynamical low-rank methods for Boltzmann type collisional kinetic equations, building on certain prior knowledge about the low-rank structure of the solution.

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