Understanding the efficiency of dynamical low-rank techniques for kinetic equations

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Using low-rank techniques to solve kinetic problems has seen increasing interest lately. This has been facilitated by algorithmic advances which make such methods more robust as well as their ability to easily accommodate semi-Lagrangian and spectral discretizations. In this talk, based on both numerical and theoretical results, we will discuss the behavior of these methods in order to elucidate for which problems they can be successfully applied. In particular, we will discuss their behavior close to the fluid regime and introduce a numerical scheme that conserves the corresponding moments up to machine precision. Although a mathematical analysis can only be performed for simplified models, such an analysis can still offer insight that translates well to the more complicated problems that are of interest in practice. We will further discuss some computational aspects.