Numerics for dynamics, respecting geometry

Abstract

Geometric aspects play an important role in the construction and analysis of structure-preserving numerical methods for a wide variety of ordinary and partial differential equations. Here we illustrate this interplay by two important problem classes. We review the development and theory of symplectic integrators for Hamiltonian ordinary and partial differential equations, as initiated by Prof. Feng Kang 40 years ago, and we highlight the role of geometry in dynamical low-rank approximation of high-dimensional evolutionary problems.