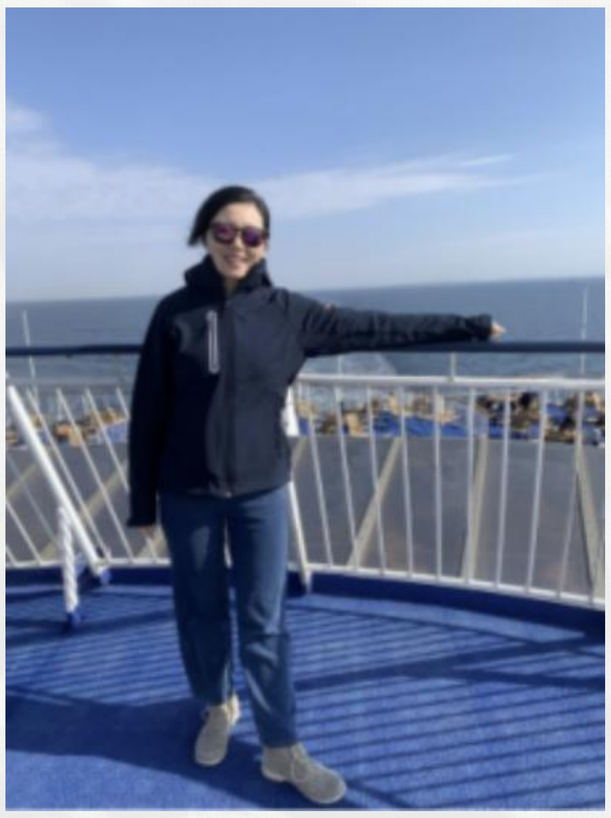
数据科学与深度学习青年学者论坛

Structure-Preserving Methods for Linearly Perturbed Hamiltonian Systems



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摘要： Dissipative Hamiltonian systems arise in mechanical vibrations, dispersive models, and many complex physical systems. This talk presents an energy-stable splitting exponential integration framework for linearly perturbed dissipative Hamiltonian systems. By reinterpreting SAV and its Lagrange-multiplier variant from a Poisson-system viewpoint and coupling the resulting Hamiltonian subsolvers with the exact damping subflow, we obtain two schemes: SEISAV, which ensures modified-energy dissipation with only a scalar linear algebraic solve, and SEILM, which enforces original-energy dissipation through a scalar nonlinear constraint. We also briefly discuss CSympNet-ID for conformal-symplectic one-step map learning and interpretable damping identification from snapshot data.

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