Contribution ID: **43** Type: **Poster**

DEIM-based hyper-reduction of metriplectic systems

Monday, 20 January 2025 16:00 (2 hours)

Metriplectic or GENERIC systems describe complex dynamical systems that blend Hamiltonian and dissipative dynamics, i.e. systems that conserve energy and produce entropy. Maintaining the separation between Hamiltonian and dissipative part in the construction of approximate models is a challenging task. In this work, we employ a matrix-based implementation of the Discrete Empirical Interpolation Method (DEIM) to perform hyper-reduction of the Hamiltonian term in metriplectic systems. This approach is integrated with a structure-preserving reduced-order algorithm developed in [A. Gruber, M. Gunzburger, L. Ju, Z. Wang, CMAME 2023] that guarantees the retention of the properties needed for energy conservation and entropy production. We present some numerical results to test the performances of the proposed method. Our results indicate that, while maintaining similar accuracy and structure-preservation, the evaluation of the reduced model is computationally cheaper when using the DEIM-enhanced method.

Primary authors: BENVENUTI, Andrea (Università di Pisa); PAGLIANTINI, Cecilia (University of Pisa)

Presenter: BENVENUTI, Andrea (Università di Pisa)

Session Classification: Poster Session