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Reduced-Order Modeling (ROM) for MSR multiphysics simulations

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A Proper Orthogonal Decomposition based Reduced-Order Model (POD-ROM) is presented for parameterized multiphysics computations of the Molten Salt Fast Reactor (MSFR) concept. The reduced-order model is created using the method of snapshots where the training set is obtained by exercising a Full-Order Model (FOM). The steady state model solves the multi-group diffusion k-eigenvalue equations with moving precursors together with the energy equation. A known, steady state velocity field is assumed throughout the computations. The Discrete Empirical Interpolation Method (DEIM) is used for the efficient coupling of the ROM solvers, while the input parameter space is surveyed using the Improved Distributed Latin Hypercube Sampling (IHS) algorithm.

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