# POD reduced order modeling for evolution equations utilizing arbitrary finite element discretizations

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The main focus of the present work is the inclusion of spatial adaptivity for snapshot computation in the offline phase of model order reduction utilizing Proper Orthogonal Decomposition (POD-MOR). For each time level, the snapshots lie in different finite element spaces, which means in a fully discrete setting that the snapshots are vectors of different lengths. In order to overcome this obstacle, we present a discretization independent POD reduced order model, which is motivated from a continuous perspective and is set up and solved explicitely without interpolation of the snapshots. In contrary to empirical interpolation methods, we introduce a projection based approach for the treatment of nonlinear evolution equations in order to circumvent the interpolation onto a common spatial grid. The analysis for the error between the resulting POD solution and the true solution is carried out. Finally, we present numerical examples to illustrate our approach.

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