

Improved POD: Parallel Algorithms and Basis Selection

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The Proper Orthogonal Decomposition, or POD, is a popular technique for developing optimal feedback control laws for partial differential equations. The POD develops a reduced-basis from a given set of simulations and a reduced-order model is generated by Galerkin projection onto this basis. This reduced-order model is used to construct feedback control laws that are then used in the original PDE system. There are a number of limitations to this POD technique, however. The most important is the appropriate generation of a “representative” basis that adequately captures the dynamics of the system. In this talk, we describe a number of improvements to the way POD is carried out that are appropriate for complex, parameter dependent PDEs. In particular, we discuss alternatives to the standard POD basis and the construction of the reduced-order basis vectors when using parallel PDE solvers.

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