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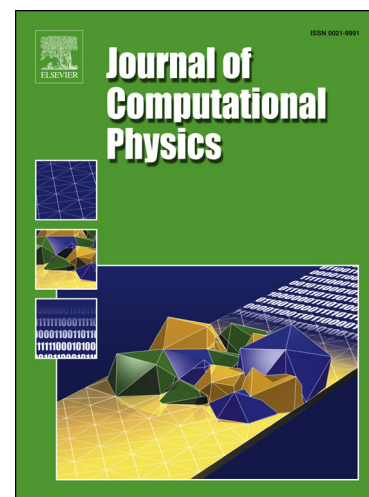
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A stabilized POD model for turbulent flows over a range of Reynolds numbers: optimal parameter sampling and constrained projection

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Abstract

We present a reduced basis technique for long-time integration of parametrized incompressible turbulent flows. The new contributions are threefold. First, we propose a constrained Galerkin formulation that corrects the standard Galerkin statement by incorporating prior information about the long-time attractor. For explicit and semi-implicit time discretizations, our statement reads as a constrained quadratic programming problem where the objective function is the Euclidean norm of the error in the reduced Galerkin (algebraic) formulation, while the constraints correspond to bounds for the maximum and minimum value of the coefficients of the N -term expansion. Second, we propose an *a posteriori* error indicator, which corresponds to the dual norm of the residual associated with the time-averaged momentum equation. We demonstrate that the error indicator is highly-correlated with the error in mean flow prediction, and can be efficiently computed through an offline/online strategy. Third, we propose a Greedy algorithm for the construction of an approximation space/procedure valid over a range of parameters; the Greedy is informed by the *a posteriori*

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