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Model Adaptation in Parametric Space for POD-Galerkin Models[1] HAOTIAN GAO, MINGJUN WEI, Kansas State University — The development of low-order POD-Galerkin models is largely motivated by the expectation to use the model developed with a set of parameters at their native values to predict the dynamic behaviors of the same system under different parametric values, in other words, a successful model adaptation in parametric space. However, most of time, even small deviation of parameters from their original value may lead to large deviation or unstable results. It has been shown that adding more information (e.g. a steady state, mean value of a different unsteady state, or an entire different set of POD modes) may improve the prediction of flow with other parametric states. For a simple case of the flow passing a fixed cylinder, an orthogonal mean mode at a different Reynolds number may stabilize the POD-Galerkin model when Reynolds number is changed. For a more complicated case of the flow passing an oscillatory cylinder, a global POD-Galerkin model is first applied to handle the moving boundaries, then more information (e.g. more POD modes) is required to predicate the flow under different oscillatory frequencies.

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Mingjun Wei
Kansas State University

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