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Uncertainty Quantification of the Dynamic Mode Decomposition ANTHONY DEGENNARO, SCOTT DAWSON, CLARENCE ROWLEY, Princeton University — This work explores and quantifies the statistical effect that parameterized uncertainty has on the dynamic mode decomposition (DMD). For the data under consideration, such uncertain parameters could include Reynolds number, geometry, or random sensor/signal noise in the system. The aims of this study are twofold: firstly, to quantify the robustness of the algorithm in terms of pertinent identified quantities (such as DMD modes and eigenvalues), thus expanding upon recent work in this area, and secondly, to present a method for analyzing the underlying dynamic systems from data in an efficient manner. We use polynomial chaos expansions to represent the relevant DMD quantities of interest. This approach can be computationally more efficient than sample-based methods (e.g., Monte Carlo) when the dimensionality of the parameter space is moderate. We demonstrate our methodology on a number of well-studied example systems, including numerical simulations of flow past a circular cylinder.

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