Abstract Submitted
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Characterizing and correcting for the effect of sensor noise in the dynamic mode decomposition[1] SCOTT DAWSON, MAZIAR HEMATI, MATTHEW WILLIAMS, CLARENCE ROWLEY, Princeton University — Dynamic mode decomposition (DMD) provides a powerful means of extracting insightful dynamical information from fluids datasets. Like any data processing technique, DMD's usefulness relies on its ability to extract real and accurate dynamical features from noise-corrupted data. Here we show analytically that sensor noise can bias the results (eigenvalues and modes) of the DMD algorithm. This bias can be accurately predicted, to the point that we may derive an analytic correction factor that facilitates its removal. We propose a number of additional modifications to the DMD algorithm that reduce or eliminate this bias, even when the noise characteristics are unknown. We demonstrate the performance of these modifications on a range of synthetic, numerical, and experimental datasets, and also compare and integrate our modified algorithms with other DMD variants proposed in recent literature.

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