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Predictability of the Dynamic Mode Decomposition in Coastal Processes RUO-QIAN WANG, University of California, Berkeley, LIV HERDMAN, United States Geological Survey, MARK STACEY, University of California, Berkeley, PATRICK BARNARD, United States Geological Survey — Dynamic Mode Decomposition (DMD) is a model order reduction technique that helps reduce the complexity of computational models. DMD is frequently easier to interpret physically than the Proper Orthogonal Decomposition. The DMD can also produce the eigenvalues of each mode to show the trend of the mode, establishing the rate of growth or decay, but the original DMD cannot produce the contributing weights of the modes. The challenge is selecting the important modes to build a reduced order model. DMD variants have been developed to estimate the weights of each mode. One of the popular methods is called Optimal Mode Decomposition (OMD). This method decomposes the data matrix into a product of the DMD modes, the diagonal weight matrix, and the Vandermonde matrix. The weight matrix can be used to rank the importance of the mode contributions and ultimately leads to the reduced order model for prediction and controlling purpose. We are currently applying DMD to a numerical simulation of the San Francisco Bay, which features complicated coastal geometry, multiple frequency components, and high periodicity. Since DMD defines modes with specific frequencies, we expect DMD would produce a good approximation, but the preliminary results show that the predictability of the DMD is poor if unimportant modes are dropped according to the OMD. We are currently testing other DMD variants and will report our findings in the presentation.

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