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Retrograde Estimation and Forecasting of Chaotic Systems. Part 2: Application to Chaotic and Multiscale Model Problems CHRISTOPHER COLBURN, JOSEPH CESSNA, THOMAS BEWLEY, University of California-San Diego — Application of the new algorithm for estimation and forecasting of chaotic systems, discussed in Part 1 of this presentation, to Lorenz, Kuramoto-Sivashinsky, and Navier-Stokes systems is discussed. For the Lorenz case, an interactive GUI has been developed to illustrate the various features and performance of the new strategy, which categorically outperforms existing strategies for the forecasting of this model. For the Kuramoto-Sivashinsky case, significant regularization is required to enable backwards-in-time marches of the state and forward-in-time marches of the adjoint; nonetheless, the retrograde algorithm is observed in numerical experiments to outperform existing methods. For the Navier-Stokes case, the regularization issue is less severe, and becomes even less of an issue as the Reynolds number is increased towards the Euler limit appropriate for many large-scale turbulent flows of interest (hurricanes, contaminant plumes, etc.).

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