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Kevin B. Flores*, Department of Mathematics, North Carolina State University, Raleigh, NC 27540. *Forecasting and uncertainty quantification using a hybrid of mechanistic and non-mechanistic models.*

Traditionally, either mechanistic or non-mechanistic modeling techniques have been used for prediction, however it is uncommon for the two to be incorporated together. We compare the forecast accuracy of mechanistic modeling, using Bayesian inference, a non-mechanistic modeling approach based on state space reconstruction, and a hybrid composed of the two using simulated and experimental data. The experimental data come from cannibalistic flour beetle populations, in which it has been observed that the adults preying on the eggs and pupae results in non-equilibrium population dynamics. Uncertainty quantification methods for the hybrid models are outlined and illustrated on these data. We perform an analysis of the results from Bayesian inference for the mechanistic model and hybrid models to suggest reasons why hybrid modeling may enable more accurate forecasts of multivariate systems than traditional approaches. (Received September 26, 2017)