Parameter identification from scalar time series generated by a chaotic Malkus-Lorenz water wheel[1] LUCAS ILLING, Reed College — We show how a simple experimental implementation of the Malkus-Lorenz water wheel exhibits both chaotic and periodic behavior in agreement with predictions from the Lorenz model. We then use the angular velocity data of the wheel to address the general problem of how to estimate unknown model-parameters from scalar outputs of chaotic systems. We discuss and compare two estimators: one is based on a novel globally convergent adaptive observer, the second is an extended Kalman filter.

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