1125-62-2399 **Andrea Arnold*** (anarnold@ncsu.edu) and **Alun L. Lloyd**. *Nonlinear filtering for periodic time-varying parameter estimation in an epidemic model.*

Many systems arising in biological applications are subject to periodic forcing, such as seasonal forcing in epidemiological systems. In these types of applications, the forcing parameter is not only time-varying in nature but also has a periodic structure. We present an approach to estimate periodic time-varying parameters using nonlinear filtering. In particular, we employ the ensemble Kalman filter (EnKF) to estimate the periodic seasonal contact rate in an epidemic model for the spread of measles.

In the literature, most parameter estimation methodology is aimed at parameters treated as constant or as drifting over time with no imposed structure. The proposed technique imposes a periodic structure on the contact rate by treating it as a piecewise function consisting of parameters that change, e.g., each month. The augmented EnKF implementation also allows for estimation of model initial conditions as well as the reporting probability, which is vital for predicting under-represented data such as the incidence data considered here. In particular, results are demonstrated on real time-series data of measles case reports from various regions, including monthly reported cases in Baltimore, MD, (1928-1963) and weekly reported cases in England and Wales (1948-1967). (Received September 20, 2016)