



## **Parameter estimation for dynamic nonlinear models using the merging particle filter**

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Estimation of values of uncertain parameters in dynamic system model is one of useful applications of sequential data assimilation. While Kalman-filter-like algorithms provide good parameter estimates for linear systems, it is not easy to estimate the values of uncertain parameters for nonlinear systems. In this presentation, we introduce the use of the merging particle filter (MPF) algorithm for parameter estimation in nonlinear system models. The merging particle filter (MPF) is an improved algorithm of the particle filter (PF), in which each posterior ensemble member is obtained by combining several members in the prior ensemble. The MPF allows us to avoid the ensemble degeneration problem with a relatively small ensemble size. We conducted twin experiments using a simple nonlinear model. In the twin experiments, we used the PF and the ensemble Kalman filter (EnKF) as well as the MPF, and compared their performances. The results suggest that the convergence of the PF is rather poor. It is also found that the accuracy of the EnKF is limited probably due to the existence of the nonlinearity in the system. In comparison with the other two algorithms, the MPF tends to provide a better parameter estimate.