# A general filtering framework for data assimilation in large scale forecasting systems

**H. Madsen**, J.V.T. Sørensen

DHI Water - Environment - Health, Agern Allé 5, DK-2970 Horsholm, Denmark
(hem@dhigroup.com)

The use of data assimilation in large scale hydrodynamic and hydrological forecasting systems has advanced considerably in recent years. This paper provides a review of the developments, considering the data assimilation problem within a general filtering framework. This framework incorporates updating of different modelling components in the forecast system, including model state, model forcing and model parameters. It includes as a special case the classical Kalman filter. Various extensions of the filter especially tailored towards operational applications are reviewed. These include (i) approximate Kalman filter schemes that utilize cost-effective approximations of the error modelling, (ii) combination of filtering and forecasting of model prediction errors, (iii) filtering with coloured or biased model errors, and (iv) application of regularization techniques.