Title: STATE (HYDRODYNAMICS) IDENTIFICATION IN THE LOWER ST. JOHNS RIVER USING THE ENSEMBLE KALMAN FILTER

This thesis presents a method, EnKF, is applied to a high-resolution, shallow water equations model of the Lower St. Johns River with 4 observation data at 4 stations. EnKF, a sequential data assimilation method for non-linear problems, is developed for tidal flow simulation for estimation of state variables, i.e., water levels and depth-integrated currents for overland unstructured finite element meshes. The shallow water equations model is combined with observation data, which provides the basis of the EnKF applications. In this thesis, EnKF is incorporated into DG ADCIRC-2DDI code to estimate the state variables.

Upon its development, DG ADCIRC-2DDI with EnKF is first validated by implementing to a low-resolution, shallow water equations model of Quarter Annular Harbor with 6 stations data. Second, EnKF is implemented to a high-resolution, shallow water equations model of the Lower St. Johns River with observation data at 3 stations of 4 and compared to the observation data at the other station as a target station. Third, EnKF simulates four times with different target stations to present effective observation data locations.

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Approved for distribution by Dr. Scott C. Hagen, Committee Chair, on March 16, 2012.

The public is welcome to attend.