STOCHASTIC ANALYSIS OF A ONE-DIMENSIONAL TIDALLY DRIVEN ESTUARY

by

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Abstract

Propagation of the tidal wave into estuaries is affected by factors which introduce uncertainites in the water depths and velocities. Analysis of unsteady flow in estuarine systems with uncertainites has been performed with Monte Carlo methods. These methods have the distinct disadvantage of requiring large amounts of computer resources. A new approach for modeling uncertainties in tidally driven estuaries is presented. A quasi-analytical approach is developed to solve the hydrodynamic equations for a one-dimensional tidally driven estuary with uncertainities introduced through the tidal boundary condition. Results are obtained as the moments of the distributions of the state variables. Solutions from a Monte Carlo model and from the quasi-analytical model are compared. It is shown that the quasi-analytical method is a viable approach to the solution of stochastic estuarine problems. It has advantages over the Monte Carlo approach such as: 1) greatly increased computational efficiency; and 2) no reliance on pseudo-random number generators to mimic a desired statistical distribution.

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