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A Semi-Implicit, Three-Dimensional Model for Estuarine Circulation: Usgs Open-File Report 2006-1004

By Peter E Smith

Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.A semi-implicit, finite-difference method for the numerical solution of the three-dimensional equations for circulation in estuaries is presented and tested. The method uses a three-time-level, leapfrog-trapezoidal scheme that is essentially second-order accurate in the spatial and temporal numerical approximations. The three-time-level scheme is shown to be preferred over a two-time-level scheme, especially for problems with strong nonlinearities. The stability of the semi-implicit scheme is free from any time-step limitation related to the terms describing vertical diffusion and the propagation of the surface gravity waves. The scheme does not rely on any form of vertical/horizontal mode-splitting to treat the vertical diffusion implicitly. At each time step, the numerical method uses a double-sweep method to transform a large number of small tridiagonal equation systems and then uses the preconditioned conjugate-gradient method to solve a single, large, five-diagonal equation system for the water surface elevation. The governing equations for the multi-level scheme are prepared in a conservative form by integrating them over the height of each horizontal layer. The layer-integrated volumetric transports replace velocities as the dependent variables so that the...



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