عنوان مقاله:

CBS Finite Element Model for Shallow Water Problems

محل انتشار:

هفتمین همایش بین المللی سواحل، بنادر و سازه های دریایی (سال: 1385)

تعداد صفحات اصل مقاله: 5

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خلاصه مقاله:

Numerical study of flow behavior in rivers and coasts has an interesting range of applications in fields such as river hydraulics, environmental hydraulics and other similar activities. In this work the formulation of a finite element numerical model for the shallow water equations is introduced and the model is tested using some standard examples cited in the literature. The depth integrated shallow water equations govern the hydrodynamics in the shallow water bodies and one of suitable numerical techniques of these PDEs is the CBS finite element algorithm. The foundation of the algorithm is the fractional step method initially introduced by Chorin [1] in the finite difference context for the incompressible Navier-Stokes equations. The algorithm permits some interesting and useful advantages. Firstly, it provides a critical time-step in terms of the current velocity instead of the wave celerity. It is a relevant property for low Froude number problems. Secondly, the procedure allows the application of the standard Galerkin method along the characteristics due to the split of the pressure type terms. Finally, the most important advantage of the procedure is its capability for using in the both subcritical and supercritical flows. This method firstly introduced by Zienkiewicz [5] for modeling of shallow water equations in the finite element context. Over the past decade, many investigations have demonstrated the efficiency of this method for shallow water problems. Notable studies on this subject have been carried out by Ortiz et al. [2, 3 and 5]. This paper is devoted to the description of the CBS finite element method .capabilities for modeling of some interesting problems in the shallow water field

کلمات کلیدی:

Characteristic based split finite element, shallow water, dam break, shoaling