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二维溃坝洪水波传播的高精度数值模拟(PDF)

Title: High-resolution numerical simulation of 2D dam-break flood waves

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摘要: 建立了二维浅水方程的高分辨率数学模型。求解浅水方程时,将方程做空间差分算子分裂,并沿各空间方向采用有限体积法积分方程,应用二阶上风TVD格式确定有限体积交界面处的物理量通量。应用该模型对矩型明渠坝体瞬间全溃的洪水波进行了计算,并将计算值与理论解进行了比较;最后用该模型对大坝瞬间局部溃倒所致的洪水演进过程进行了数值模拟,对模拟结果进行了定性分析,并与其它算法进行了比较,表明该模型对模拟溃坝洪水波是有效的。

Abstract: This paper is concerned with a High-Resolution mathematical model for 2D shallow water equations,The 2D shallow water equations were split into two systems of equations in x and y directions by using the strange type operator splitting method,and were solved with the one-dimensional upwind TVD(total variation diminishing) schemes and FVM method(finite volume method).This model is used to predict 1D flood process caused by an instantaneous total dam-break,and compare with the analytic solutions of the problem.And this model is also used to predict a 2D flood evolution process caused by the instantaneous partial dam-break,and the simulating results were analyzed qualitatively.The computed results indicate that this model is fairly effective on simulating dam-break flood waves.

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