

NUMERICAL SOLUTION OF THE SHALLOW WATER EQUATION BY USING SPREADSHEET

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ABSTRACT

Natural hazards occupy the essential and regional levels, hence, they are raised as a priority issues. The 2009 Saudi Arabia floods affected Jeddah, on the red sea (western) coast. As of January 3rd, 2010, 122 people are reported to have been killed. Roads were under a meter of water. Unfortunately, Lack of knowledge in water flow modeling contributes to prevent manage flood risks. This paper provided the spreadsheet model as solver to solve wave propagation due to sudden closure of the downstream gate or closed road. A Wave propagation flow is simulated by numerically solving the one-dimensional saint venant equations by using a second-order explicit finite-difference (McCormack) scheme. This method has been verified with using lux diffusive scheme. Spreadsheets as new solution technique is used to simulate unsteady flow in open channel which is a practical method. The results obtained by using the Saint Venant equations are compared to determine the depth at each elven sections which the maximum depth was 6.858437 m at time around 1050 second. It is found that, the Saint Venant equations give sufficiently accurate results for the maximum flow depth and the time to reach this value at a location downstream.

KEYWORDS: Saint Venant, Spreadsheets, McCormack Scheme