

Simulation Of 2D Dam-Break Fluid Dynamics Using Finite Difference Method Of Forward Time Backward Scheme (FTBS)

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ABSTRACT

Hydrometeorology disaster have a high probability to occur in Indonesia. Water reservoirs such as dam could gain critical structural damage due to extreme weather condition. This study aims to create a 2D dam-break simulation using a finite difference method of Forward Time Backward Scheme (FTBS) validated by an analytical solution. This study solves the Shallow Water Equation (SWE) or the Saint-Venant Equation which is based on the conservation of mass and momentum derived from the Navier-Stokes equation. The numerical simulation code was built using the finite difference method, the most common and simplest method for dam-break modeling. The numerical scheme used was the Forward Time Backward Scheme (FTBS). At the initial stage, a 1D dam-break simulation was made, the results of which were validated with an analytical solution. From the results of data analysis, the RSME value is relatively small, namely 0.0076. Hence, it can be concluded that the code created can simulate a 1D dam-break relatively well. Furthermore, the code was developed to create a 2D dam-break simulation whose results were compared with previous studies. The results of qualitative and quantitative comparisons show that the 2D simulation code built with FTBS can quite satisfactorily represent the dam-break phenomenon.

Kata Kunci: *Dam Break, Navier-Stokes, Saint-Venant, Finite Difference Method, Forward Time Backward Scheme (FTBS)*