University of Zabol
Graduate School
School of Engineering
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Thesis for Master's degree in Civil Engineering - Water

Pollution transport simulation using finite volume method on the triangular irregular network structures

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A**bstract:**

Understanding the space-time dynamics of pollutant transport remains an essential impediment to accurate prediction of impacts on the ecology of rivers and coastal areas and also for establishing efficient strategies for pollution control and environmental protection. Numerical models are a powerful tool to study the water flows and pollutant transport. In this study, a two-dimensional fully-coupled model of shallow water flow and pollutant transport were developed using a triangular unstructured grid. The model is based on a cell-centered upwind finite volume method using the HLL approximate Riemann solver.

A multidimensional linear reconstruction technique and multidimensional slope limiter were implemented to achieve a second-order spatial accuracy. In order to make the model efficient and stable, an explicit-implicit method was used in temporal discretization by an operator splitting technique. To check the accuracy of the model, the model was applied to two standard examples. The numerical results show that the model could accurately predict the flow dynamics and pollutant transport in Ajichay River.

Keywords: Shallow water equations, pollution transport, finite volume method, the approximate Riemann solver HLL, networks with irregular structure