Fluid dynamics modeling for concentration variation in Kondok tributary using MIKE11

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Abstract

The modeling approach of concentration variations in rivers, basins is an important goal for predicting the interactions between main processes of hydrodynamic flow. Computational Fluid Dynamics (CFD) is modeling used for monitoring the behavior of flow components. In this study the simulation of flow hydrodynamic and concentration changes together with the sediment transport are considered. MIKE11 was selected for the modeling application in the case study. The basis of finite volume method with one dimensional procedure in the software is compatible with circumstances of the case study territory. The main equation is the shallow water equations in which the scale of features in the horizontal is much greater than the vertical direction. The shallow water equations are applied for more efficient numerical solution of flow in this environment. Furthermore equations describing the transport and fate of constituents in the water such as contaminants with sediment can be coupled to the hydrodynamic equations. The necessary data for simulation depends on time- series data such as wind direction, wind velocity, initial concentration values and flow components including temperature and salinity. Primarily, analyzing the hydrodynamic and concentration variation is processed. Then calibration has done during the optimization. Finally, the outcome and the observed data compared with the appropriate simulation. The more compatible results made to the best approximation of modeling for prediction of concentration.

Key words: Computational Fluid Dynamic, MIKE 21, Modeling, Eco-Lab Concentration, sediment transport

1. Introduction

The hydrodynamic module is based on the numerical solution. Choosing the MIKE 11 is a professional engineering software package for the simulation of flows, water quality and sediment transport in estuaries, rivers, irrigation systems, channels and other water bodies. It is a dynamic, user-friendly one-dimensional modeling tool for the detailed design, management and operation of both simple and complex river and channel systems. Due to its exceptional flexibility and speed MIKE 11 provides a complete and effective design environment for engineering, water resources, water quality management and planning applications. A number of simulated parameters can be selected for modeling consist of velocity, discharge, slope, cross section area, resistance, and Froude number.[1], The case study for modeling selected in Iran for Kondok reservoir, in which it contains preliminary data's. Procedure of simulation involves, hydrodynamic modeling and sediment transport, by coupling of the Eco – lab concentration [2]. Finally, the outputs of the modeling compared with observed data's and respectively, with the more calibrated simulation, the more compatible results will be shown [3].