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Applied Modeling of Computational Fluid Dynamic for Eco-Lab concentration changes with sediment transport

(Case Study Shadegan Lake)

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Abstract

The simulation of hydrodynamics and transport of different substances in lakes and reservoirs is a developing tool in order to predict their internal processes and interactions. Computational fluid dynamic (CFD) modeling allows the combination of these factors to calculate the behavior of all different configurations. In this research modeling of the hydrodynamic flow of heavy metal concentration that is in variation with sediment transport was analyzed. The finite volume method is used to descrete the governed equations of the model. Accordingly, for the modeling of the parameters carried out in the finite volume method. Two-dimensional depth-integrated model MIKE 21 was used in this study to simulate hydrodynamic and advection-dispersion processes in a full-scale flow. Shallow water equations are used for this purpose, since the scale of features in the horizontal direction is much greater than the vertical, also Lakes are much larger in length and width than they are in depth, and flows of water in the volume are predominantly horizontal. 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. Case study should have appropriate some data for modeling the hydrodynamic of flow, then should be analyzed with numerical method in MIKE 21. Accurate modeling depends on a time history of water surface elevation, current velocity, temperature and salinity. The data for simulation, prepared as time series and line series data, is combined together in the model. The benefits of MIKE 21is that the model contains interaction between hydrodynamic flow and eco-lab module in simulation. Beside this, it involves sand and sediment transport. After the initial run of the software, analyzing the hydrodynamic and eco-lab module parameters has taken into account. The calibration of parameters by proposed amounts of software manual packs, were edited. Finally, adjusting the optimized amounts for both modules in simulation, the last run of model has done. Output data compared with observed data for accurate discussion. Output is consist of different parameters in which operator can combine them or plotted each outcome separately. For precise results, considering parallel parameters such as hydrodynamic flow of heavy metals and sediment transport made into an applicable conclusion. By comparison of verified data and observed data of the real case, it seems that the model is compatible with the parameters of hydrodynamic and eco-lab in real data's.

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