A THREE DIMENSIONAL NUMERICAL MODELLING OF SEDIMENT TRANSPORT IN ESTUARINE ENVIRONMENTS

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Estuaries and coastal areas contain many valuable resources for economic, social and recreational interests. However, they are the regions with extensive changes in the hydrodynamics and water quality due to several human activities such as coastal defence constructions, harbours and dredging. This research aims at addressing the influence of vertical and horizontal mixing (diffusion process) on the suspended sediment transport in estuarine environments, which are affected by tidal fluctuations. The study is based on a three-dimensional numerical modelling using the advection-diffusion equation. Several numerical experiments have been carried out. These experiments investigate the capability of the advection-diffusion equation to model the suspended sediment transport. The investigation is conducted using a numerical research model and schematic test cases.

Since the CPU time is so important factor in the three-dimensional numerical modelling, special attention has been paid to the computational time of each component in the advection-diffusion equation. The preliminary results showed that the finite difference using the total variation-diminishing (TVD) scheme is a robust numerical solution comparing to the analytical methods.