Application of an unstructured finite volume Riemann solver to sediment transport in the Nador lagoon

F. Benkhaldoun[1], S. Daoudi[2], I. Elmahi[2,*], M. Seaïd[3]

[1] *LAGA, Université Paris 13, 99 Av J.B. Clement, 93430 Villetaneuse, France*
[2] *ENSAO, EMCS, Complexe Universitaire, B.P. 669, 60000 Oujda, Maroc*
[3] *School of Engineering and Computing Sciences, University of Durham, South Road, Durham DH1 3LE, UK*

Abstract

In this contribution, the Non Homogeneous Riemann Solver (SRNH) is used to solve the shallow water equations (SWE) coupled to concentration and sediment transport-diffusion equations. As real application is considered here the Nador lagoon. The lagoon is located on the Moroccan eastern coast and exchanges water flow with the Mediterranean sea. The variation of bathymetry, the friction terms, coriolis and eddy-diffusion are taken into account in the model. The scheme is used on unstructured meshes. In order to satisfy the C-property of the numerical scheme while keeping the space accuracy, a modification in the discretisation of the bed slop source terms is proposed. The algorithm preserves the positivity of the water depth and sediment concentration and satisfies the conservation property. Several scenarios are presented and demonstrate the high resolution of the proposed method and confirm its capability to provide accurate and efficient simulations for sediment transport in the Nador lagoon.

Keywords. Finite volume, SRNH scheme, Unstructured mesh, Adaptive mesh, Sediment transport, Nador lagoon.

*Corresponding author: `ielmahi@ensa.ump.ma`