RBF for the numerical solution of the shallow water turbulence model: Application to the Strait of Gibraltar

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Abstract.

Fluid dynamics problems are highly nonlinear and many numerical solution alternatives based on Navier Stokes equations or Reynolds equations with single or double phase closure turbulence model were proposed.

In this paper, we present an alternative model obtained by depth averaging of the full Reynolds equations, i.e Saint Venant equations or so called shallow water equations for the study of lake hydrodynamics. Saint Venant equations are usually dealt with quite conventional grid based discretisation methods such as finite difference method (FDM), finite element method (FEM), with characteristics or finite volume method (FVM). In this paper we present meshless method known as radial basis functions ($RBFs$) method.

The proposed method was validated by compared with experimental data and are found to be satisfactory. The emphasis in this paper is on the applications of the proposed method for numerical simulation of the sea surface elevations and current in the Strait of Gibraltar. The numerical solution is shown to be robust.

Key words : Shallow-water equations, $k-\epsilon$ model, Radial Basis Functions ($RBFs$).

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