NUMERICAL SIMULATION OF HYDRODYNAMIC AND TRANSPORT PHENOMENA IN INTERTIDAL COASTAL AREAS

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ABSTRACT

In this paper, a second order Taylor-Galerkin FEM model for the numerical simulation of the hydrodynamic and of the evolution of the salinity in intertidal coastal areas is presented. The mathematical model consists of two coupled systems of differential equations: the shallow water hydrodynamic equations and the shallow water advective-diffusive transport equation. The physical and mathematical model includes some important aspects such as the effects of the tides taking into account the seabed could be exposed, the volume of fresh water provided by the rivers and the effects of the winds. Thus, different types of boundary conditions are considered.

The proposed approach can be applied to the prediction of the possible effects of civil engineering public works and other human actions (dredging, building of docks, spillages, etc.) on the marine habitat, and to evaluate their environmental impact in areas with high productivity of fish and of seafood. In this work, we analyze the effects of different dredging options in a formation of sandbanks in the Arousa Estuary (Galicia) in the northwest of Spain considering different meteorological conditions.

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