

THE INCOMPRESSIBLE NAVIER-STOKES SYSTEM WITH FREE SURFACE AND VARIABLE DENSITY

lundi 18 juin 2018 17:30 (30 minutes)

We are interested in the numerical approximation of hydrostatic free surface flows with variable density. Such variable density flows occur when fresh water and sea water mix, in estuaries for instance; or when cold water mixes with warm water. We begin by writing the Navier-Stokes model with variable density, where the local density is a function of a tracer. A multilayer discretization of the system is performed, for which an energy balance is obtained. A kinetic interpretation of the multilayer system then allows to formulate a finite volume kinetic scheme. The numerical properties of the scheme are studied. 3D simulations are shown. One of our applications is the flow occurring when a tide lock between sea water and fresh water opens.

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Classification de Session: Session 1

Classification de thématique: Présentation orale