

INTERFACE-CAPTURING FREE-SURFACE FLOWS IN OPEN DOMAINS

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Abstract. An interface-capturing technique is performed for solving incompressible free-surface flows with the finite element method. The technique assumes that there are two immiscible phases, identified by a level set function, which are assumed as viscous and Newtonian. The methodology consists of solving alternately three steps: i) the Navier-Stokes equations for the fluid state, using equal order elements for velocity and pressure, stabilized with streamline-upwind/Petrov-Galerkin and pressure-stabilizing/Petrov-Galerkin strategies; ii) an advective problem for transporting the level set function; iii) a renormalization stage for keeping a smooth transition across the interface. The main attention here is focused on open domains, where artificial boundaries are imposed in order to bound the numerical problem. Numerical examples are typical free-surface flows with artificial contours.