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Sharp Interface Treatment for Free Surface Flows in an Unstructured Level Set Finite Element Framework[1] HAEGYUN LEE, CHING-LONG LIN, LARRY WEBER, IIHR-Hydroscience and Engineering, The University of Iowa, Iowa City, Iowa 52242 — A numerical method that couples the incompressible Navier-Stokes equations with the sharp-interface level set method on an unstructured mesh is presented for study of free surface flows. The method is based on the previously developed diffuse-interface model of Lin et al. (Int. J. Numer. Meth. Fluids, 2005). The model employs characteristic finite element method together with the fractional four-step algorithm to discretize and time-integrate the governing equations. The sharp-interface treatment is known to have some advantage over the diffuse-interface method in that it does not suffer from the unphysical spurious parasitic velocity at the interface. The developed model is verified with several benchmark problems including the two-dimensional dam break problem. The results are in good agreement with experimental data and other numerical result.

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