

Abstract Submitted
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Immersed Boundary Method for Shallow-Water Flow Solvers

NING ZHANG, McNeese State University — The immersed boundary method (IBM) has been widely applied with Navier-Stoke equation solvers for flows over moving objects or objects with complex shapes. However, the IBM has not been often used with shallow-water flow solvers for estuary modeling applications. In regional scale hydrodynamic simulations, man-made or natural land structures such as levees, floodgates and small rivers/streams often have smaller scales than the grid resolutions in the simulations. Therefore, IBM could be a good candidate to realize the small shapes/forms of those structures on coarser simulation grids. In this study, IBM formulations have been developed to realize the floodgates and small rivers for several 2D depth-averaged shallow-water equation solvers. The research targets coastal areas in southwest Louisiana, particularly, the Calcasieu Lake and the surrounding coastal wetlands. The wetlands are protected by levees to avoid direct floods through the lake shore. The wetland water comes from the frequent floods through many small streams connecting the wetlands with the lake. It is very expensive to have grid resolutions smaller than the sizes of the streams. It is thus a good candidate for an IBM approach.

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