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Analysis of Double-Free Surface Flow through Gates Using Element-Free Galerkin Method

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In the analysis of free surface flows under gates, computational difficulties arise not only from the non-linear nature of the boundary conditions but also from the fact that the boundary is not known a priori. There are additional difficulties when the problem involves two highly curved unknown free surfaces and arbitrary curved shape boundaries. The goal of the present work is to develop a suitable and accurate numerical procedure based on moving least square method (MLS) and element-free Galerkin method (EFG) for the computation of free surface profiles, velocity and pressure distributions and flow rate in a two-dimensional gravity fluid flow through a radial gate. The results of the calculations are compared with those obtained from a hydraulic model test. It is found that the method can be successfully used in the analysis of free surface flow through the radial gates and locating two free surface profiles. It converges almost rapidly and the results obtained are in good agreement with the experiment.

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