Abstract

Many shallow flows can be found in nature such as tsunami, flooding in coastal cities, flows in river channel, tidal, etc. These shallow flows can be simulated by using the well-known Shallow Water Equations (SWE). One important nonlinear phenomenon in the shallow flows is the runup phenomenon. Especially for simulating accurately runup phenomenon, special treatment in numerical implementation of the model should be considered. In this paper, we implemented the 2D SWE with the Finite Volume method on momentum conservative *staggered grid* for numerical implementation. To improve computational performance especially for simulating large computational domain with high resolution grid, we parallelize the numerical scheme by using OpenMP architecture. Performance of the parallel implementation is measured by calculating the speedup and efficiency. From the results of the parallelization, the maximum speedup is 3.95 times for 4 threads and 6.61 times for 8 threads. The maximum efficiency in computational time is obtained 91.4% for 4 threads and 82.7% for 8 threads for cases with a large number of computing grids.

Keywords: OpenMP, parallel, Shallow Water Equations, *staggered grid*, Shallow Flows