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Numerical modeling of tsunami wave run-up on beaches using a Lattice Boltzmann solver[1] JANNETTE FRANDSEN, University of Hawaii — In this contribution, the suitability of a LBGK modeling approach is tested to examine the behavior of free surface water waves in shallow water. The present 1-D LBGK model discretizes the tidal wave equations and approximate the collision between particles using a single time relaxation. The non-linear free-surface dynamics are accounted for through the non-equilibrium particle distribution function. It is notable that no additional algorithm or surface boundary conditions are required. We should stress that the present model can only expect to work well for a continuous surface in shallow water. The case study of concern involves testing the solvers ability to handle wave run-up on beaches. The predictions of the shoreline trajectory represent a classical bench mark test of numerical models, especially because of the challenge of accurately predicting the wave motion when the depths are vanishing into dry-states. The present test case represents a tsunami generated wave run-up/run-down study on a beach. No special treatment of the shoreline motion has been prescribed herein, as the LB solver handles the moving interface between water and land automatically. The LB solution compares fairly well with results of other investigators including an analytical solution, the non-linear shallow water equations and Boussinesq solutions.

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