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Bore propagation in 1-D and 2-D using a Lattice Boltzmann approach JANNETTE FRANDSEN, Louisiana State University — The objective of this research is to investigate the performance of a discretized form of the Lattice Boltzmann (LB) equations to model free-surface water in shallow water. The solutions are based on free-surface flows in square tanks which are excited in harmonic horizontal motions. The available equilibrium distribution functions for shallow water waves are utilized. The discretized solution on uniform grids implements an elastic-collision scheme assuming slip boundaries at the tank walls and bed. Typically at water depths h/b greater than 0.09 (h is the still water depth and b is the width of the tank), the water slosh back and forth. Herein the focus is on horizontally dominating free-surface waves as opposed to sloshing motions, i.e. h/b less than 0.09, since the governing equations are based on shallow water wave theory. The forcing amplitude is varied corresponding to tank aspect ratios h/b = 0.05. At this shallow water depth, it is known that traveling waves or bores will form depending on the forcing amplitude and frequency. The LB experiments reported on are limited to weak bores. The LB free surface results agree well with a Riemann solver and experimental data. The 1-D predictions suffice for the test cases studied.

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