

GODUNOV-TYPE NUMERICAL SCHEME FOR A MODEL OF GRANULAR FLOW FOR PARTIALLY OPEN TABLES

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ABSTRACT. A finite volume Godunov type well-balanced scheme based on discontinuous flux for hyperbolic conservation laws is proposed for a 2×2 system of non-linear partial differential equations which models the dynamics of growing sandpiles generated by a vertical source on a flat bounded rectangular table [1]. The so-called partially open table problem is being considered where sand is blocked by a wall (of infinite height) on some part of the boundary of the table. Presence of walls can result in unbounded or discontinuous surface flow density at equilibrium resulting in solutions with singularities. Numerical experiments with rectangular meshes are presented to illustrate that the proposed schemes detect these singularities in the equilibrium solutions efficiently and comparisons are made with the previously studied finite difference and Semi-Lagrangian approaches by Finzi Vita et al[4, 5, 6].

Keywords: Finite volume scheme, Discontinuous flux, Hyperbolic conservation laws, Granular flow, Sandpile, Partially Open Table

Mathematics Subject Classifications (2010): 35L65, 65M12

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