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FINITE VOLUMES FOR THE SIMULATION OF UNSTEADY SHALLOW WATER FLOWS

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Summary. When applying the unsteady shallow water model to the simulation of overland flow in urban flooding problems it is necessary to handle correctly all kind of situations related to the complex geometry that can appear. The numerical model used to solve the system of equations has to provide well balanced solutions (equilibrium in cases of still water) and to maintain non-negative water depths for simulations involving wetting and drying transitions. Due to the complex topographic features involved in some cases, strong discontinuities in the bed elevation may appear, and as a result the suitability of the numerical model employed can be compromised. Godunov methods have been found a reliable tool to simulate realistic scenarios but, to ensure a correct performance of the numerical solution in all cases, the approximations involved to generate the numerical method have to be revisited. This revision results in new approximate solutions and a complete definition of the stability region avoiding additional tuning parameters commonly found in literature. Also, the proposed new solver indicates that the definition of well-balanced equilibrium in trivial cases is not sufficient to provide correct results: it is necessary to provide discrete evaluations of the source term that ensure energy dissipating solutions when demanded.