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Modeling the flash flood of Cannes (Fr) with Basilisk

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Abstract: We propose an open source solver to model flash floods, using the well-known shallow-water equations, in 2 dimensions. The full resolution of such equations have usually a high computational cost, so that majority of flood simulation softwares used for flood forecasting is using a simplification of this model, which is not relevant in the case of flash flood, where torrential flows are commons. To reduce drastically the cost of such 2D simulations, we propose a 2D shallow-water flow solver built with the open source code Basilisk (<http://basilisk.fr/>) which is using adaptive refinement on a quad-tree grid. We reproduce the flood of Cannes (France) which happened in October 2015 and which led to huge damage, human and material. We show that the simulation is faster than the event. We also show that our simulation predicts accurately the areas harshly touched by the flood.

Keywords: flash flood, shallow water, multi-scale, adaptive grid, quad tree.