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A general comparison between the solutions generated by the FVC scheme and dierent exact solutions

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Hydrodynamic transport problems often take the form of hyperbolic conservation law systems (see e.g. [6, 5]). In this work we will focus on the Saint-Venant system which is still the utmost important model in maritime or fuvial hydraulics simulations, it governs the free surface shallow water flows. It was obtained from Navier-Stokes equations using adequate assumptions see [7]. Due to their widely recognized experimental validity and numerical effciency, the Saint-Venant equations are now widely used for many current simulations: environmental protection, environmental pollution, natural disasters, climate change, dam failure, tidal calculations, flood studies, sedimentology, etc. We are mainly interested in the numerical resolution of this system using a robust scheme called FVC. This scheme is accurate, conservative and solve the non-linear conservation laws without Riemann Solvers, it has been presented in several works e.g. [8, 3, 2].
In this paper, we will compare our FVC approach, using unstructured 2-D meshes, to some exact solutions for shallow water system, present in the literature, under the infuence of the gravity, the Coriolis force, and other frictional forces effects see [4, 1].

Key-words: Shallow water system, Free surface fows, Finite volume method, Exact solutions , FVC.

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