



Handling geophysical flows: Numerical modelling using Graphical Processing Units

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Computational tools may help engineers in the assessment of sediment transport during the decision-making processes. The main requirements are that the numerical results have to be accurate and simulation models must be fast. The present work is based on the 2D shallow water equations in combination with the 2D Exner equation [1]. The resulting numerical model accuracy was already discussed in previous work.

Regarding the speed of the computation, the Exner equation slows down the already costly 2D shallow water model as the number of variables to solve is increased and the numerical stability is more restrictive. On the other hand, the movement of poorly sorted material over steep areas constitutes a hazardous environmental problem. Computational tools help in the predictions of such landslides [2].

In order to overcome this problem, this work proposes the use of Graphical Processing Units (GPUs) for decreasing significantly the simulation time [3, 4]. The numerical scheme implemented in GPU is based on a finite volume scheme. The mathematical model and the numerical implementation are compared against experimental and field data. In addition, the computational times obtained with the Graphical Hardware technology are compared against Single-Core (sequential) and Multi-Core (parallel) CPU implementations.

References

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