GPU software and architecture comparisons for numerical simulation of partial differential equations

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Abstrak

ABSTRACT
This paper will show a comparison between the Kepler, Maxwell and Pascal GPU architectures using CUDA-Fortran, with and without dynamic calls, to efficiently solve partial differential equations. The target is to show the possibility of using affordable hardware, such as the GTX670, GTX970 and GTX1080 NVIDIA GPUs, which are commonly found in personal and portable computers, for scientific applications. For simplicity we consider a standard wave equation where we use a second order finite difference method for the spatial and time discretizations to obtain the numerical solution. We found that, as we increase the spatial resolution of the domain we also increase the performance difference between the GPU and the Central Processing Unit (CPU)