

CILAMCE 2009 MINI-SYMPOSIUM PROPOSAL

Title: High Performance Computing on Graphics Hardware (GPGPU)

Organizers:

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After a long period of steady growth, desktop commodity computer architecture has reached its ceiling on computing performance. Further progress is no longer enabled by growth in core clock rates, but by growth in parallelism. Many articles have been presented at the CILAMCE 2008 on the use of multi-cored computing applied to a variety of problems. Furthermore, there is a growing trend toward parallel computation on the recently created general-purpose graphics hardware (GPGPU) [1]. Due to its architecture, the GPU is specially well-suited to address problems that can be expressed as data-parallel computations with high arithmetic intensity (the ratio of arithmetic operations to memory operations) [2]. Recent works have been shown astonishingly fast computations. For instance, papers on the use of GPGPU for computational mechanics have been reporting performances up to 100 times faster than CPUs for solution of linear systems, and around 800 times faster for numerical solution of infinite oscillatory integrals [3, 4]. The idea of the present mini-symposium is to gather researchers working on HPC tasks using GPGPU systems, aiming to discuss the state of the art issues, exchange experiences and solutions for existing implementation strategies and problems.

[1] OWENS, J. D. et al., “A Survey of General-Purpose Computation on Graphics Hardware”, *Computer Graphics*, **26**, 1 (2007), pp. 80-113.

[2] NVIDIA. “NVIDIA CUDA – Compute Unified Device Architecture – Programming Guide”. NVIDIA Corporation, Santa Clara (2008).

[3] FATAHALIAN, K., SUGERMAN, J., HANRAHAN, P. Understanding the Efficiency of GPU Algorithms for Matrix-Matrix Multiplication. *Graphics Hardware* (2004) – T. Akenine-Möller, M. McCool (Editors).

[4] MESQUITA, E.; SILVA, J. L.; FERREIRA, L. O. S. “Implementation of Longman’s Method for Numerical Integration on Graphics Hardware” In: 10th US National Congress on Computational Mechanics, 2009.