SISMA

Séminaire Informatique Scientifique & Mathématiques Appliquées

Towards an efficient GPU implementation of the neutron transport sweep algorithm on cartesian and hexagonal meshes using Kokkos

Gabriel Suau et Ansar Calloo
CEA/DES

The deterministic resolution of the neutron transport equation consists in several nested iterative algorithms. For each iteration, a discretized transport operator must be inverted on the spatial domain for a set of discrete directions and energy groups. For each (cell, direction, group) triplet, a local solution can be computed by assembling and solving a small linear system (O(1-100)), where the right-hand-side depends on the solution of the immediate upstream neighbors of the cell, resulting in an ordered sweep of the mesh to get the global solution. In recent works, we implemented a portable parallel and vectorised implementation relying exclusively on the Kokkos library, that exhibits good performance on multicore CPUs. Thanks to Kokkos, the implementation is portable and can be executed on GPUs, but with very limited performance gains compared to a CPU execution, which led us to rethink the parallelisation strategy. In this presentation, I will talk about our ongoing work on the development of an efficient sweep algorithm for GPU architectures.

Contact: lihpc-sisma@cea.fr