Preliminary results on GPU Acceleration of the PIC Simulation Code OSIRIS Using CUDA XIANGLONG KONG, M.C. HUANG, C. REN, University of Rochester — Modern graphics processing units (GPUs) equipped with NVIDIA's massively multithreaded computing architecture, with their teraflop performance potential and high memory bandwidth, offers an opportunity to greatly improve the performance of Particle-in-cell (PIC) codes. There are a variety of approaches being developed for porting PIC codes to a GPU. In this poster we describe how multi-threaded algorithms were implemented for the key parts (field solver, particle pusher, current deposition, current smoothing) of an existing PIC simulation code (OSIRIS) on a GPU using the programming environment CUDA. Initial speedups with double-precision operations will be described. Write conflicts in the current-to-gird deposition part are identified as the performance bottleneck. We will compare several different methods of resolving the write conflicts. We acknowledge the OSIRIS Consortium. This work was supported by DoE under Grants Nos. DE-FG02-06ER54879 and DE-FC02-04ER54789.

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