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OpenCL-Accelerated Primitive Variable Recovery for General Relativistic Magnetohydrodynamics KRISTEN BOYDSTUN, CHRISTIAN D. OTT, PHILIPP MOESTA, California Institute of Technology — In conservative numerical schemes for general relativistic magnetohydrodynamics (GRMHD), a procedure is required to convert between the “conserved” variables and the “primitive” variables (density, velocity, internal energy) at each time integration step. However, there is no explicit form for the recovery of the primitive variables from the conserved variables, and a system of non-linear equations must therefore be solved numerically with an iterative approach. Primitive variable recovery lies at the heart of GRMHD schemes, and its cost is of great concern to large-scale simulations. We investigate the use of the OpenCL framework to accelerate primitive variable recovery. We describe our parallelization approach, and present our performance results on both the CPU and GPU.

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