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BoxMG with OpenCL

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OpenCL is an important new standard that offers portability and performance across a wide variety of modern computing architectures, including CPUs, GPUs and various accelerators. Because modern architecture designs require high degrees of data parallelism to fully reach their potential efficiency, adapting algorithms to expose more parallel operations is of critical importance. In this talk, we present work on adapting BoxMG to use OpenCL for a full device-side V-cycle implementation that includes smoothing, residual calculation, interpolation and restriction. Additionally, we present an extension to the parallel cyclic-reduction (PCR) algorithm used to perform line relaxation that removes constraints on problem size by using PCR in conjunction with Wang's algorithm.