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Domain decomposition method on GPU cluster for Lattice

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The modern graphic processing unit (GPU) has become one of the powerful computational device. Applying GPU to the lattice QCD computation has been investigated especially for the inversion solver of the discretized Dirac operators. Most of the previous works on lattice QCD with GPU, however, have been done with single GPU card. Since the single GPU performance and the memory size are limited at a few TFlops and of a few GBytes, the lattice sizes are limited to rather small sizes. Thus, to simulate QCD on more realistic lattice we need a cluster system with multiple GPU's. The GPU cluster system requires a special care on the GPU-GPU-intercommunication because the modern GPU lacks the direct GPU-GPU communication feature. In order to make a good performance with a cluster with GPU, we investigated a domain decomposition preconditioner for the O(a)-improved Wilson-Dirac fermion inverter, where the lattice is decomposed into domains. In this talk we report some performance results on the additive Schwarz preconditioner on GPU cluster computing.

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talk

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