Contribution to Podium discussion

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August 14-17, "Numerical Challenges in LQCD" workshop

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- Not involved in GPU-coding
- All I know on multigrid methods from [2013]:

ADAPTIVE AGGREGATION BASED DOMAIN DECOMPOSITION MULTIGRID FOR THE LATTICE WILSON DIRAC OPERATOR *

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Abstract. In lattice QCD computations a substantial amount of work is spent in solving discretized versions of the Dirac equation. Conventional Krylov solvers show critical slowing down for large system sizes and physically interesting parameter regions. We present a domain decomposition adaptive algebraic multigrid method used as a preconditioner to solve the "clover improved" Wilson discretization of the Dirac equation. This approach combines and improves two approaches, namely domain decomposition and adaptive algebraic multigrid, that have been used separately in lattice QCD before. We show in extensive numerical tests conducted with a parallel production code implementation that considerable speed-up over conventional Krylov subspace methods, domain decomposition methods and other hierarchical approaches for realistic system sizes can be achieved.

- And e-mail exchange with Gustavo Ramirez

The following questions emerged from an e-mail discussion with Gustavo Ramirez:

- Deflation (with approximate projection) as a multigrid method seems tricky to be ported to GPU architectures in an efficient way.
- Can one understand why ? Is that solely due to the poor scalability of the 'little Dirac operator' ?
- Isn't that then a general problem for (aggregation-based) multigrid methods on GPU ? The same scalability issue should be present for the near-kernel Dirac operator.
- Are there more ideal solvers for pure GPU architectures (not hybrid CPU-GPU) ?

From a collaboration with american colleagues. Algebraic Multigrid methods (point smmothing + approximate eigenvectors) have been efficiently ported to GPU systems (SUMMIT).
Does this suffer of a V^2-problem ?