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Diagonal Kenney-Laub Rational Approximation to the Overlap Dirac Operator

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Preliminary results are presented for an implementation of the overlap Dirac operator in lattice QCD based on the diagonal Kenney-Laub (KL) rational approximation to the matrix sign function. Both the Wilson and Brillouin Dirac operators are tested as kernels. As in any other rational approximation, the diagonal KL iterates of order (n,n) can be decomposed into partial fractions with n poles, which are inverted using a multi-shift conjugate gradient solver. This representation requires no spectral information, simplifying the implementation. We compute the PCAC quark mass and pion mass and determine the critical bare mass for several n , confirming that the additive mass shift and the violation of the Ginsparg–Wilson relation decrease monotonically with n . We also compare the Wilson and Brillouin kernels and find favorable performance for the latter in terms of CPU time.

Parallel Session (for talks only)

Algorithms and artificial intelligence

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