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Hierarchically deflated conjugate residual

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Hierarchically deflated conjugate residual

We present a new class of multigrid solver algorithm suitable for the solution of 5d chiral fermions such as Domain Wall fermions

and the Continued Fraction overlap. Unlike HDCG \cite{arXiv:1402.2585}, the algorithm works directly on a nearest neighbour fine operator. The fine operator used is Hermitian indefinite, for example $\Gamma_5 D_{dwf}$, and convergence is achieved with an indefinite matrix solver such as outer iteration based on conjugate residual.

As a result coarse space representations of the operator remain nearest neighbour, giving an 8 point stencil rather than the 81 point stencil used in HDCG.

It is hoped this may make it viable to recalculate the matrix elements of the little Dirac operator in an HMC evolution.

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