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Lattice gradient flow with tree-level $O(a^4)$ improvement in pure Yang-Mills theory

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Recently, the Yang-Mills gradient flow method has continued to develop remarkably. The most successful application is demonstrated in an accurate determination of a reference scale. However, there is still room for improvement with respect to the lattice gradient flow, where some lattice artifacts are found to be non-negligible. Following a recent paper by Fodor et al. (arXiv:1406.0827), we examine several types of tree-level improvements on the flow action with various gauge actions in order to reduce the lattice discretization error. In this talk, we will present our numerical results for reference scale t_0 using tree-level, $O(a^4)$ improved lattice gradient flow including the rectangle term in the flow action, and discuss effects of the discretization error in the lattice gradient flow.

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