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Use of Schwinger-Dyson equation in constructing an approximate trivializing map

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As the precision test of the standard model has become accurate, the need for fine lattices has been increasing. However, as we approach the continuum limit, we get into the critical region of the theory and encounter critical slowing down. Among many studies tackling this problem, we develop the idea of trivializing map, whose use in lattice calculation was proposed by Luscher. With this field transformation, the theory of interest will be mapped to the strong coupling limit. Luscher gave an analytic formula to construct the trivializing map in the form of t -expansion, where t is the trivializing-flow time. In this work, we alternatively use the Schwinger-Dyson equation to obtain the trivializing map approximately. In this method, we choose a set of Wilson loops to include in the flow kernel by hand and determine their coefficients from the expectation values of the Wilson loops. The advantages of this method over the t -expansion are two-fold: (1) We can circumvent the rapid increase of necessary Wilson loops which we have in increasing the order of t -expansion because the basis can be chosen arbitrarily. (2) We can expect to obtain a reasonable approximation of the trivializing map also for large beta because the coefficients are determined from a non-perturbative evaluation of the expectation values. In this talk, we show preliminary results applying our method to pure Yang-Mills theory.

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