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The perturbative computation of the gradient flow coupling for the twisted Eguchi–Kawai model with the numerical stochastic perturbation theory

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The gradient flow method has become an important tool which enables us to efficiently extract the nonperturbative low energy physics from lattice simulations. In this study we perturbatively compute the gradient flow scheme coupling for the SU(N) twisted Eguchi—Kawai (TEK) model using the numerical stochastic perturbation theory (NSPT) in the large-N limit. We evaluate the perturbative coefficients of the gradient flow coupling in terms of the lattice bare 't Hooft coupling up to three-loop and successfully extract the universal one-loop beta function using the NSPT combined with the Lüscher—Weisz formula relating the $\overline{\mathrm{MS}}$ and lattice bare couplings. The feasibility of extracting the higher order beta function coefficients for the gradient flow scheme with the NSPT will be discussed.

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