The Static Approximation to B Meson Mixing using Light Domain Wall Fermions: Perturbative Renormalization and Ground State Degeneracies

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We discuss the theoretical input into our current calculation of $f_{B_{d,s}}$ and $B_{B_{d,s}}$ using the Iwasaki gauge action, light domain wall quarks, and a smeared static heavy quark propagator. We present the complete one-loop, mean-field improved matching of heavy-light current and four-fermion lattice operators onto the static continuum theory renormalized in $\overline{\text{MS}}$(NDR). The large degeneracies present in a static calculation are addressed and a method for extracting $f_B$ and $B_B$ using only box sources is described; implications for future calculations are discussed.