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Error bounds for the asymptotic expansions of the Hermite polynomials

We present explicit and computable error bounds for the asymptotic expansions of the Hermite polynomials with the Plancherel–Rotach scale. Three cases, depending on whether the scaled variable lies in the outer or oscillatory interval, or it is the turning point, are considered separately. We introduce the "branch cut" technique to express the error terms as integrals on the contour taken as the one-sided limit of curves approaching the branch cut. This new technique enables us to derive simple error bounds in terms of elementary functions. We also provide recursive procedures for the computation of the coefficients appearing in the asymptotic expansions.