Finite-size corrections and numerical calculations for long spin 1/2 Heisenberg chains in the critical region.

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Leading and next-to-leading-order finite-size corrections to the ground and first excited states are calculated for the spin-1/2 anisotropic Heisenberg model in the critical region. The analytic results are compared to numerical data obtained for chains up to a length of N=1024. It is found that, near the isotropic point, the asymptotic region where the results obtained for N to infinity are applicable sets in at very large N values, and for obtaining good accuracy in fitting the numerical data one has to take into account several correction terms, even at large (N>100) chain lengths.
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