

DUAL FORMULATION OF NONABELIAN LATTICE MODELS AND RELATED MATHEMATICAL PROBLEMS

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S u m m a r y

Compact nonabelian lattice models (like 3D QCD, 2D $SU(N)$ principal chiral models) are formulated in terms of plaquette (or link) variables which correspond to the continuum field-strength representation. Using this representation, we derive an exact dual formulation for the partition function and some observables like a Wilson loop, two-point correlation function, etc. It is applied to the study of the low-temperature region of the models relevant to the construction of the continuum limit. In particular, we compute the leading term of the asymptotic expansion of the dual Boltzmann factor and prove that it converges at low temperatures to a certain Gaussian distribution uniformly in all fluctuations of dual variables. The possible applications of our construction to a calculation of long-distance observables are discussed. Of independent interest might be the derivation of a new asymptotic expansion for matrix elements of the $SU(2)$ rotation matrix in the vicinity of unity which is uniform in representations and magnetic numbers.