

ABSTRACT

In the study of critical phenomena by the real space renormalization group theory, the weight function to a great extent determines whether or not the new system is a true representation of the old system. There are two conditions which must be imposed on the weight function before a renormalization transformation can be performed. Additional conditions might lead to a better transformation and therefore close to exact critical properties, but it is not clear what these conditions should be. In this work we investigate additional properties that could be imposed on the weight function so as to give improved results for particular systems, and thus give clues to a general prescription for a weight function in the renormalization group theory.

A brief outline of the physics of phase transitions and critical phenomena is presented and some different methods of approach to the problems encountered in critical phenomena are briefly discussed.

The prescription for the determination of the weight function, $P(\mu, \sigma)$, is described and implemented in a real space renormalization group transformation. A generalized sign rule is applied to the 2-dimensional square Ising antiferromagnet and although quite successful for this,

the rules are found not to be appropriate for higher order systems. A study of the 2-dimensional triangular and square lattices with a weight function which was dependent on the coupling strength of the system, is also reported.

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