

The Critical Properties of One-Dimensional Extended Hubbard Model

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Abstract: In the framework of nonperturbative quantum field theory, the critical phenomena of one-dimensional extended Hubbard model (EHM) at half-filling are discussed from weak to intermediate interactions. After the EHM being mapped into two decoupled sine-Gordon models, the ground state phase diagram of the system is derived in an explicit way. It is confirmed that the coexisting phases appear in different interaction regimes which cannot be found by conventional theoretical methods. The diagram shows that there are seven different phase regions in the ground state, which seems not to be the same as previous discussions, especially the boundary between the phase separation and condensed phase regions. The phase transition properties of the model between various phase regions are studied in detail.

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Key words: one-dimensional extended Hubbard model, bosonization, phase diagram, coexisting phase

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