EXACT RESULTS FOR THE ZERO-BANDWIDTH EXTENDED HUBBARD MODEL WITH INTERSITE CHARGE AND MAGNETIC INTERACTIONS

Waldemar Kłobus[a], Konrad Kapcia[b], and Stanisław Robaszkiewicz[b]

[a]Division of Quantum Electronics, Faculty of Physics, Adam Mickiewicz University, Umultowska 85, 61-614 Poznań, Poland
[b]Electron States of Solids Division, Faculty of Physics, Adam Mickiewicz University, Umultowska 85, 61-614 Poznań, Poland

The extended Hubbard model in the zero-bandwidth limit is studied. The Hamiltonian consists of (i) the effective on-site interaction U, (ii) the intersite density-density interaction W and (iii) the intersite Ising-like magnetic exchange interaction J between nearest-neighbors. We present rigorous results obtained within the transfer-matrix method for one dimensional chain in two particular cases: (a) $W = 0$ and $n = 1$ (U-J model); (b) $U \rightarrow +\infty$ and $n = 1/2$ ($W \neq 0$, $J \neq 0$). We obtain the exact formulas for the partition function and calculate the thermodynamic properties such as entropy s, specific heat c and double occupancy per site D. The system exhibits the interesting temperature dependence of c involving a characteristic two-peak structure. In both cases there are no phase transitions at finite temperatures and the only transitions occur in the ground state: in the case (a) at $U/|J| = -1$ — (anti-)ferromagnet – nonorder transition and in the case (b) at $W/|J| = 1$ — (anti-)ferromagnet – charge-order transition. Exact ground state diagrams for the U–W–J model (at half-filling) in arbitrary dimensions are also presented.

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Corresponding author :

Konrad Kapcia

Address for correspondence :

Electron States of Solids Division, Faculty of Physics, Adam Mickiewicz University, Umultowska 85, 61-614 Poznań, Poland

Email address :

kakonrad@amu.edu.pl