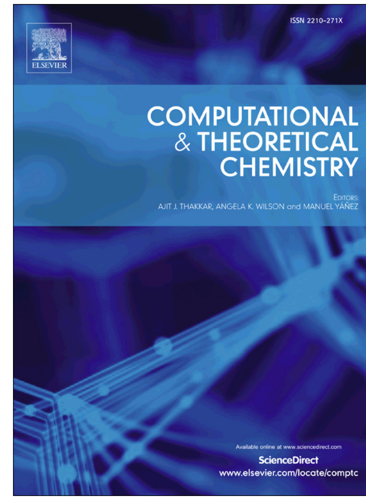
Accepted Manuscript



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PII: S2210-271X(17)30139-1
DOI: http://dx.doi.org/10.1016/j.comptc.2017.03.026
Reference: COMPTC 2453

To appear in: *Computational & Theoretical Chemistry*

Received Date: 15 December 2016
Revised Date: 21 March 2017
Accepted Date: 21 March 2017

Please cite this article as: V.O. Cheranovskii, E.V. Ezerskaya, D.J. Klein, V.V. Tokarev, LOWEST ENERGY STATES OF HUBBARD LADDER MODEL WITH INFINITE ELECTRON REPULSION, *Computational & Theoretical Chemistry* (2017), doi: http://dx.doi.org/10.1016/j.comptc.2017.03.026

LOWEST ENERGY STATES OF HUBBARD LADDER MODEL WITH INFINITE ELECTRON REPULSION

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Abstract

We apply cyclic spin permutation formalism to the study the lowest energy states of the infinite-repulsion Hubbard model on *n*-leg ladders. For ladder fragments with the electron densities $\rho = 1 - (2n)^{-1}$ we show that the alternation in the values of one-site energies for neighboring rungs leads to the stabilization of the ground state of ladder fragments with the maximal value of the total spin ($S_0=S_{max}$) against the increase of the interactions between rungs. The decrease of the electron density may lead to the destruction of this state. For two leg ladder fragments at the density $\rho>0.8$ we find a possibility of the transition between the ground states with $S_0=S_{max}$ and $S_0=S_{max}$ -1 with the decrease of the interaction between legs.

Keywords: Hubbard ladder model, energy spectrum, ground state spin

PACS numbers: 71.10.Fd

Introduction

Low-dimensional magnets and magnetic clusters based on the transition metal compounds have attracted much attention because of their interesting physics and potential applications in nanotechnologies [1,2]. Traditionally, the magnetic properties of these materials are described by a Heisenberg spin model which is formally identical to the covalent-space Pauling-Wheland valence band model [3]. The appearance of itinerant electrons due to the acceptor doping may change significantly the magnetic properties of these materials. For example, the phase diagrams of the corresponding molecular magnets acquire a variety of low-