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Electronic transport through aperiodic sequences of quantum dots. P.U. Korotaev, Yu.Kh. Vekilov, N.E. Kaputkina. *National University of Science and Technology "MISIS".*
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Quantum - dimensional structures are very perspective in use in optoelectronics and nanoelectronics. We investigate (analytically and numerically with perturbation theory, quasi-classic approximation) such quantum – dimensional structures as quantum dots (QD) and aperiodic sequences of QDs. Particularly we studied Thue-Morse sequence and double-periodic sequence.
We obtain energy spectra of electrons in QD and of aperiodic sequences of QDs. We estimate influence on energy spectra of sequences of QDs such control parameters as confining potential, magnetic and electrical fields. We obtained that magnetic field increases localization of electrons in QD and leads to energy spectrum shifts and obtain these shifts.
We investigate electronic transport through double QD and in aperiodic sequences of QD. We estimate that increasing of confining potential and distance between QDs leads to the tunneling probability decreasing.
Influence of external magnetic and electrical fields on the tunneling probability was investigated. We obtain that application of external fields leads to tunneling probability decreasing and that tunneling is available in finite values of external fields.
We estimate the influence of Coulomb blockade on the electronic transport .
The effect of resonance tunneling was investigated. It is important result, that when energy levels became equal resonance tunnel states (current states) are appeared. In contrast to periodic sequences localization of current states takes place only for finite values of excitations. We show that application of external fields leads to resonance tunnel states occurring.
We obtain the tunneling probability on electrons for different sequences and for different types of sequences construction.

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Superspace description of Perovskite-related $La_6Ti_4Fe_2O_{20}$ at different temperatures. Alexander Wölfel[a], Sander van Smaalen[a], Frank Lichtenberg[b]. [a]*Laboratory of Crystallography, University of Bayreuth, Germany.* [b]*Institute of Physics, Experimentalphysik VI, EKM, Augsburg University, Germany.*
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Compounds of the homologous series $A_nB_nO_{3n+2}$ (A = Ca, Sr, Ba, lanthanides; B = Ti, Nb, Ta) with n = 4, 4.33, 4.5, 5, 6 and 7 show interesting physical and electronic properties. For this reason they have been the subject of many investigations. Some of them, e.g. $La_2Ti_2O_7$ (n = 4) are high-temperature ferroelectrics, while others like $Ca_5Nb_5O_{17}$ (n = 5) show quasi-one-dimensional electronic properties [1].
In a unified superspace approach the crystal structure of the $A_nB_nO_{3n+2}$ compounds can be approximately described by the stacking of two different kind of layers, those of the composition ABO and those with pure oxygen only. The alternating stacking order of these two types of layers is violated by empty layers, whose positions depend on the value of n. Within a homologous series the stacking sequence is described by common superspace group. While the modulation wave vector and the width of the atomic domains along the internal subspace x_4 vary with the composition [2].
Here we present studies of the structures of $La_6Ti_4Fe_2O_{20}$ (n = 6), at different temperatures between 80 K and 400 K. Data is obtained from single-crystal X-ray diffraction. The purpose of this study is to better understand the mechanism of the changes in the magnetic properties of this compound in this temperature range. In addition the unified (3+1)-dimensional superspace-model can be expanded for an additional structure.

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