Theory

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Nonlinear quantum self-trapped electron centres in ferroelectrics and related materials

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Nonlinear equations and it's solutions for the quantum self-trapped and self-consistent electron states in Ferroelectrics and related systems (Ferroelastics, Ferromagnetics etc.) are investigated.
The original computing method and TRAX-program for the "exact" solution of the nonlinear differential equations is used for the calculation of thr following main integral characteristics:
1) the electron energy (ground state and excited states);
2) whole quasi-particle's energy; 3) midlle effective radius;
4) distributions of the wave function and ordering parameter of the system , etc.
One of the main new perculiarities of such autolocalized nonlinear electron centres is the branching and non-uniqueness of the ground state.
The calculations are obtained for the following cases:
1) Fluctuon of Krivoglaz's type; 2) self-trapped electron states on the exponential potential; 3) self-trapped electron states on the Yukawa's type potential (small fluctuon in the Ornshtain-Zernike model).
In the case of the Krivoglaz's type fluctuon the comparision with the direct variational method is carried out.

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