Quasi-lattice approximation of statistical systems with strong superstable interactions

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A continuous infinite system of point particles interacting via two-body strong superstable potential is considered in the framework of classical statistical mechanics.

In the present report we propose some approximation of the main quantities, which describe macroscopical and microscopical characteristics of systems, such as grand partition function and correlation functions. The main idea is in the following: we split the space $\mathbb{R}^d$ into nonintersecting hyper cubes with a volume a^d and define approximated grand partition function and the family of approximated correlation functions in such a way, that they take into account only such configurations of particles in $\mathbb{R}^d$, when there is not more than one particle in each cube.

It was shown, that for the potentials which have non integrable singularity in the neighborhood of the origin(strong superstable potentials) the pressure of the approximated system converge to the pressure of the initial system if $a \to 0$ for any values of an inverse temperature $\beta > 0$ and a chemical activity z. The same result is true for the family of correlation functions in the region of small z.

This report is based on the article [1].

1. A. L. Rebenko, M. V. Tertychnyi. Quasi-lattice approximation of statistical systems with strong superstable interactions. Correlation functions / — (arXiv:0901.0826v1[math-ph]); J. Math. Phys. — 2009. — Vol. 50, No 3.