Non-extensive thermodynamics for the Ginzburg-Landay theory of phase transitions in the strong-correlated systems

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The existence of strong correlations in many systems makes these systems non-separable from the thermodynamics point of view and all thermodynamic functions like entropy become non-extensive functions[1]. That is why recently a number of theoretical models has been proposed with use the statistical distributions different from the Gibbs one. In the present work it is investigated how the non-extensive nature of the thermodynamic functions makes an influence on their changes in the vicinity of critical point and it is proposed the corresponding model based on the Ginzburg-Landau free energy expansion in the series on order parameter as well as on a non-extensivity parameter the value of which is determined by the strength of correlations in the system. The dependence of heat capacity jump on the non-extensivity parameter is predicted and the analytical formula for this jump is derived.

[1]A.K. Rajagopal, C.S. Pande, S. Abe, Nano-Scale Materials: From Science to Technology, Eds. S.N. Sahu, R.K. Choudhury. NY:Nova Science Publishers, 241 (2006)