

Phase transitions in higher spatial derivative field theories

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We propose a model that allows one to describe the critical phenomena in systems with higher spatial derivatives of order parameters. This model makes possible to generalize the conceptions of Lifshitz and multicritical points. The upper critical dimension, that determines a range of the mean field based theories applicability in describing of critical phenomena, is found from the stability condition of the fixed point of the renormgroup transformation [1]. We evaluate the lower critical dimension, that determines the range of the existence of the ordering states, using condition of the thermodynamic stability of the system with nonzero temperature [2]. These calculations enable us to find the fluctuation region where the mean field theory description does not work. We show that the fluctuation region decreases as a function of power of nonlinearity of the model. Thermodynamic and group properties of system in space with dimension equal to the critical one are studied.

[1] A.V. Babich, S.V. Berezovsky and V.F. Klepikov, *Int. J. Mod. Phys. C*, V.22, No. 7.- \check{R} .851-857 (2008).

[2] A.V. Babich, L.N Kitcenko, V.F. Klepikov, *Mod. Phys. Lett. B*, Vol. 25, No. 22, 1839-1845 (2011).