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On conjectured local generalizations of anisotropic scale invariance and their implications HANS WERNER DIEHL, Physics Dep. U. Duisburg-Essen, SERGEI RUTKEVICH, Inst. of Solid State and Semicond Phys, 220072 Minsk, Belarus, MYKOLA SHPOT, ICMP Lviv, Ukraine — The theory of generalized local scale invariance of strongly anisotropic scale invariant systems proposed some time ago by Henkel [Nucl. Phys. B **641**, 405 (2002)] is examined. The case of so-called type-I systems is considered. This was conjectured to be realized by systems at m-axial Lifshitz points; in support of this claim, scaling functions of two-point cumulants at the uniaxial Lifshitz point of the three-dimensional ANNNI model were predicted on the basis of this theory and found to be in excellent agreement with Monte Carlo results [Phys. Rev. Lett.**87**, 125702 (2001)]. The consequences of the conjectured invariance equations are investigated. It is shown that fewer solutions than anticipated by Henkel generally exist and contribute to the scaling functions if these equations are assumed to hold for all (positive and negative) values of the d-dimensional space (or space time) coordinates $(t, \mathbf{r}) \in \mathbf{R} \times \mathbf{R^{d-1}}$. Renormalization-group improved perturbation theory in $4 + m/2 - \epsilon$ dimensions is used to determine the scaling functions of the order-parameter and energy-density two-point cumulants in momentum space to two-loop order. The results are incompatible with Henkel's predictions.

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