Temperature dependence of nuclear matter generalized symmetry energy with Skyrme-type interactions

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Considering nuclear symmetry energy coefficients (s.e.c.) as the generalized nuclear screening functions with Skyrme interactions [1] their temperature dependence is explicitly and extensively calculated at different densities. The relative variation of the isovector coefficient, and more generally of the generalized polarizabilities, is not large for temperatures in the range of 0 and 15 MeV. However we find that the n-p asymmetry of the (infinite) matter can have an influence on the qualitative behavior of the symmetry energy as temperature is varied. For n-p symmetric matter the behavior of the symmetry energy generalized coefficients with temperature can be different from the situation in which the n-p density asymmetry is above a certain particular value. This value depends slightly on the particular Skyrme force. The temperature dependence of the spin polarizability is also briefly addressed. The absolute value of the spin symmetry energy term is not well known and Skyrme forces usually do not provide reasonable values, its variation with temperature can have quite different behaviors for the different parameterizations.

References