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Regular binary thermal lattice-gases. (English) Zbl 1008.82006

Summary: We analyze the power spectrum of a regular binary thermal lattice gas in two dimensions and derive a Landau-Placzek formula, describing the power spectrum in the long-wavelength, low frequency domain, for both the full mixture and a single component in the binary mixture. The theoretical results are compared with simulations performed on this model and show a perfect agreement. The power spectrums are found to be similar in structure as the ones obtained for the continuous theory, in which the central peak is a complicated superposition of entropy and concentration contributions, due to the coupling of the fluctuations in these quantities. Spectra based on the relative difference between both components have in general additional Brillouin peaks as a consequence of the equipartition failure.

MSC:
82B20 Lattice systems (Ising, dimer, Potts, etc.) and systems on graphs arising in equilibrium statistical mechanics
82C70 Transport processes in time-dependent statistical mechanics
82B40 Kinetic theory of gases in equilibrium statistical mechanics

Keywords:
thermal lattice gas; binary mixture; transport coefficients

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