Multiharmonic regime of a incommensurate superstructure under conditions of symmetry of potential $n = 4$

Sveleba S.A., Katerynchuk I.M., Kuno I.M., Karpa I.V., Velgosh A.S., Semotyuk O.V., Kuno V.M.

Ivan Franko National University of Lviv, 107 Tarnavsky St., Lviv, Ukraine.
E-mail: incomlviv@gmail.com

The wave vector of the superstructure

In this work, a study of the wave vector of the superstructure from the parameter of anisotropic interaction and the harmonics of the wave of spatial change of the amplitude of the order parameter was carried out.
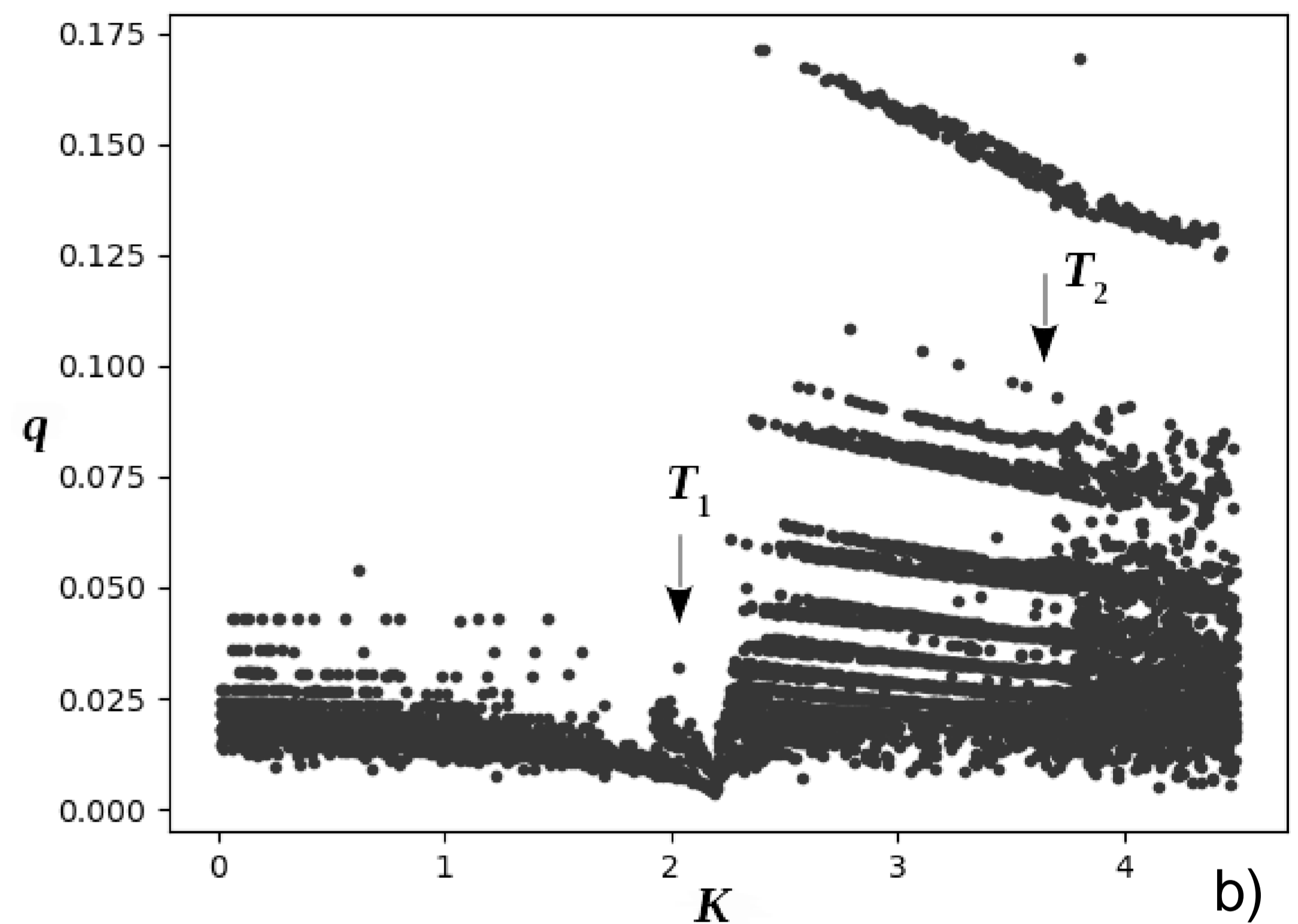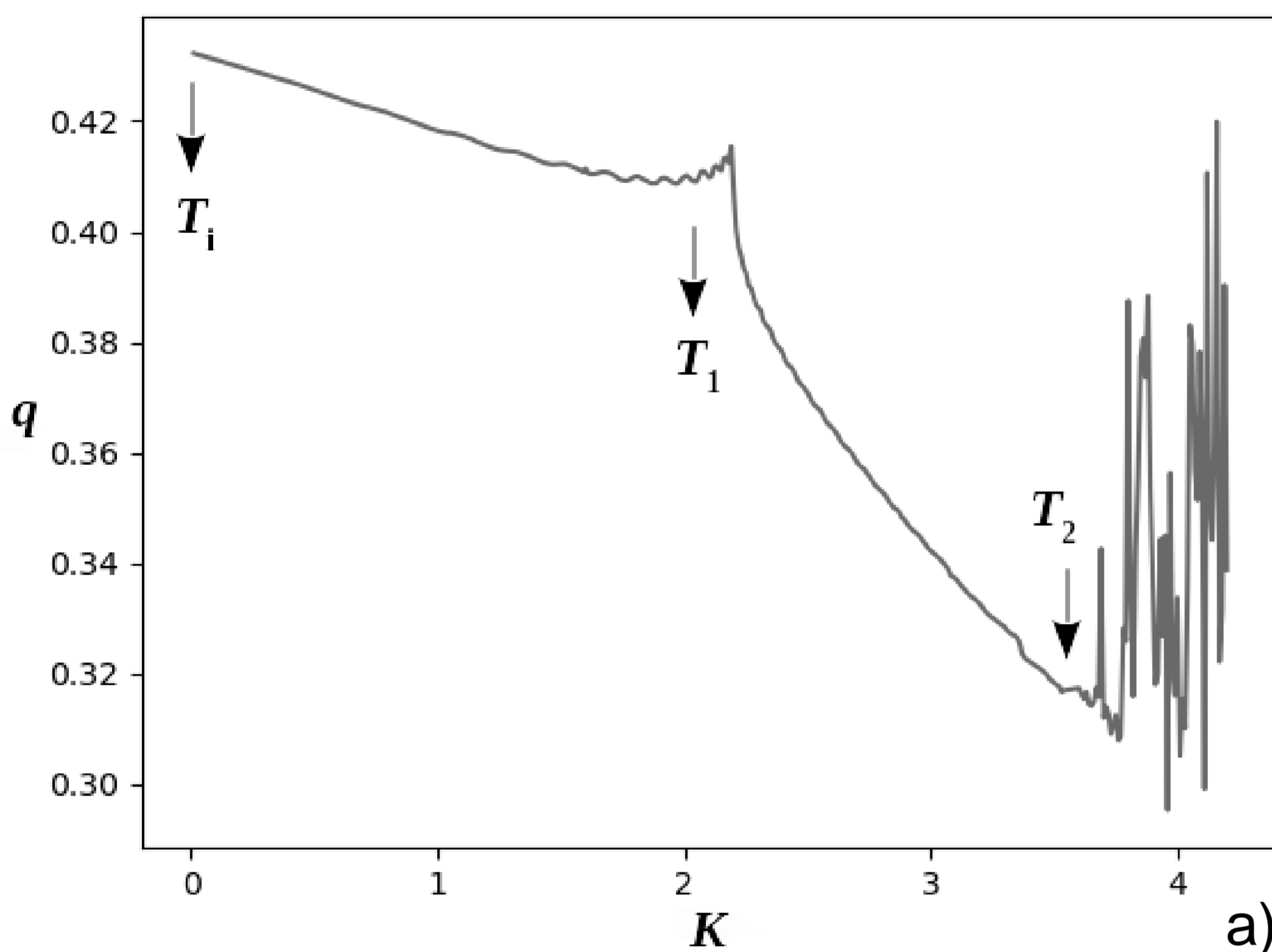
The behavior of the wave vector

a)

b)

Figure (a) shows the behavior of the wave vector (q) of the IC modulation from the value of the anisotropic interaction (K). From this dependence it follows that in the vicinity of $K = 2.1$ there is a transition (T_1) to a nonlinear dependence $q(K)$. This nonlinear dependence $q(K)$ is characterized by a stepped behavior, which is well manifested in the vicinity of the transition (T_2) to the stochastic mode of the superstructure. The stochastic mode of the superstructure is characterized by the appearance of a chaotic phase with a random value of the wave vector.

Figure (b) shows the dependence of the harmonics of the incommensurate modulation wave on the anisotropic interaction K. Both the dependence of $q(K)$ and the change of the harmonics of the IC modulation wave (Fig. 2) can be divided into two regions. In the first region of changes ($K\,0 \div 2.1$) the absence of harmonics of the IC modulation wave is observed in the first approximation. In the second region ($T_1 \div T_2$) there is a sharp increase in the number of harmonics.

Conclusion

A characteristic feature of these harmonics q is a decrease in the values of their wave vectors, which indicates an increase in the wavelength of modulations. The transition to the stochastic mode of IC modulation is accompanied by an increase in the number of modulation harmonics.