

Gendelman and Savin Reply: Yang and Hu [1] present a detailed numerical simulation of the heat conduction process in a one-dimensional lattice with a periodic potential of a nearest-neighbor interaction in the low-temperature region ($0.2 < T < 0.3$). We agree with the statement of the Comment that the results of our Letter [2] do not allow an unambiguous conclusion concerning the reality of “phase transition” from divergent to convergent heat conduction in the above region. However, the results (Fig. 1 of Ref. [1]) presented in the Comment also do not allow the unambiguous conclusion on absence of the transition. For instance, it is difficult to claim linear character of the curve $C(t)$ for $T = 0.2$ at the log-normal plot [Fig. 1(a) of Ref. [1]] for time scale $t > 600$. In addition, the behavior of this curve is somewhat different from others and cannot be extrapolated from the results of [1] for $T > 0.2$; therefore, it is possible to speculate that “something happens” between $T = 0.22$ and $T = 0.2$. The results presented in Fig. 1(c) of the Comment convey a similar message. For temperatures $T = 0.3$ and $T = 0.25$ this figure demonstrates clear saturation of the heat conduction coefficient within the error range. For $T = 0.2$ no such saturation is observed; the error range reported for the case $T = 0.2$ in Fig. 1(c) is very small, not providing any possibility for “saturating” either κ_{bulk} or κ_{eff} . Accordingly, the claim of Yang and Hu [1] on the absence of transition is not substantiated. Perhaps, in order to observe the saturation for $T = 0.2$ (again, we do not rule it out), the simulation scale should be even more.

The suggestion that any nonzero temperature will bring about a convergent transport coefficient in a chain of rotators is also rather problematic. Exponential decrease of the autocorrelation function implies that as the system approaches this limit ($T = 0$ in our case), the exponent tends to zero. Therefore, the correlation size of the system will inevitably exceed any available computational resources; thus, no decisive conclusion on the character of the thermal transport can be achieved by a solely numerical approach. In Letter [3], devoted to the chain of hard disks on substrate potential, a similar obstacle was circumvented by analytic consideration, which was verified numerically in a plausible region.

As for the chain of rotators, the situation is more complicated. There are two different types of elementary excitations (nonlinear phonons and rotobreathers). It seems that the authors of the Comment implicitly suggest that *any nonzero* density of the excited rotators will be enough to ensure the convergence of the heat conduction coefficient. We think that it is not so straightforward, since every rotator interacts with phonons and therefore has finite lifetime. In order to study the character of the heat conduction process it is necessary to thoroughly investigate the interaction between phononlike waves and the rotators (taking into account their finite lifetime) and to check the convergence of the appropriate transport coefficients. In paper [4] a qualitative analytic model is proposed to treat this question. The model developed in this paper takes into account the interaction of nearly acoustic phonons with rotobreathers; such models should be relevant for the case of low temperatures. The conclusion is that the heat conduction in the rotator model is divergent.

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