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Anomalous relaxation of damped graded elastic lattices[1] M.J. ZHENG, Chinese University of Hong Kong, J.J. XIAO, Hong Kong University of Science and Technology, K. YAKUBO, Hokkaido University, K.W. YU, Chinese University of Hong Kong — We study the relaxation of harmonic vibrational excitations of damped graded lattices with a mass gradient. In the previous work, no damping was considered [1]. In this work, we re-examine the vibrational modes in a rigorous quasi-normal mode approach. It is shown that both the damping positions and boundary conditions can affect the relaxation spectrum. Moreover, there exists a dip at the gradon transition frequency for one- dimensional (1D) graded chains with damping at two ends or on all the sites. In two-dimensional (2D) orthogonally graded squared lattices (OGSL), there exist a dip and a peak at the two boundary frequencies of soft-hard gradon region. Moreover, the dip and peak structures in the relaxation spectrum can be explained by the anomalous gradon wavefunctions.
[1] J. J. Xiao, K. Yakubo, K. W. Yu, Phys. Rev. B **73**, 054201 (2006); 224201 (2006).

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