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**Bloch oscillation and Stark localization in graded lattices**[1] KIN WAH YU, Chinese University of Hong Kong, K. YAKUBO, Hokkaido University, J. J. XIAO, Hong Kong University of Science and Technology — In this work, we report Bloch oscillation (BO) in graded elastic [1] and plasmonic [2] lattices. This is an unusual kind of oscillatory motion due to the band structure of graded lattices and is analogous to electronic BO in semiconductor superlattices. The study is related to the recently identified localized excitations called gradons which is peculiar to graded lattices [1,2]. We will use semiclassical theory to establish the conditions for BO and study the dynamics of BO in these systems. Moreover, we will confirm semiclassical solution by time-domain simulations of the propagation of wave packets. Results of these two methods will be compared. In this way, we can understand the origin of gradon localization more clearly. Results of the present research also offer great potential applications for controlling wave propagation by means of graded materials.
[1] J. J. Xiao, K. Yakubo, K. W. Yu, Phys. Rev. B **73**, 054201 (2006); 224201 (2006).
[2] J. J. Xiao, K. Yakubo, K. W. Yu, Appl. Phys. Lett. **88**, 241111 (2006); **89**, 221503 (2006).

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