Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Tunable Localization and Oscillation of Optical Signals in Planar Graded Optical Waveguide Arrays[1] MINGJIE ZHENG, The Chinese University of Hong Kong, JUN JUN XIAO, Shenzhen Graduate School, Harbin Institute of Technology, KOUSUKE YAKUBO, Hokkaido University, KIN WAH YU, The Chinese University of Hong Kong — The optical Bloch oscillation has been studied theoretically in planar graded optical waveguide arrays with nearest-neighbor couplings. The gradient in the propagation constants can be achieved conveniently by the eletro-optic effects. We identified a variety of normal modes (called gradons) in the waveguide arrays with the aid of a phase diagram. Moreover, the localization properties of the normal modes are characterized and the transitions among these modes are obtained from the analysis of a picture of overlapping bands. The existence of the Bloch oscillation and other oscillations are confirmed by using the field evolution analysis with various initial Gaussian beams. From the results, we obtain a correspondence between gradon localization and Bloch oscillation. The results offer great potential applications in controlling wave propagation by means of graded materials and graded systems, which can be used to explore the tunability of light manipulation and applied to design suitable optical devices.

[1]This work is supported by the General Research Fund of the Hong Kong SAR Government.

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Date submitted: 18 Nov 2009 Electronic form version 1.4