Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Hamiltonian Optics Approach for Hybridized Surface Plasmon Polariton in Graded Metal-Dielectric-Metal Waveguide with Periodically Varying Index SZE FUNG LEE, KING CHUN LAI, KIN WAH YU, The Chinese University of Hong Kong — In a complex plasmonic nanostucture, it is possible to support several elementary modes of surface plasmon polariton due to the multi-surface configuration. Hybridized surface plasmon polariton (HSPP) is formed when those modes interact with each others. The dispersion curves of these complex plasmon modes will be shifted from the original ones. As the shifting depends strongly on the geometry of the structure, it allows one to manage the properties of light inside the structure with much higher flexibility and complexity. We have studied the properties of HSPP in a graded metal-dielectric-metal (MDM) waveguide with the refractive index of the dielectric varying periodically, using the Hamiltonian optics approach, to investigate the feasibility of light manipulation inside this structure. We have extracted the allowed phase orbits using the quantization condition. The time series of position and wavevector of HSPP were also simulated by solving the Hamiltonian equations of motion. The results revealed two possible orbits of the HSPP inside the waveguide: confinement and propagation. The range of angular frequency such that the phase orbits become singular is also determined. In this regime, the photon energy is efficiently converted into surface plasmon energy.

Sze Fung Lee
The Chinese University of Hong Kong

Date submitted: 27 Nov 2012 Electronic form version 1.4