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Effect of Modulation on Coupled 2D-Surface Plasmons[1] GODFREY GUMBS, Hunter College/CUNY, DANHONG HUANG, AFRL/VSSS at, Kirtland, NM — We present a calculation for a two-dimensional (2D) electron gas layer interacting with a slab of conductive material. We treat the plasmons in the slab in the local limit and obtain the frequency of the coupled mode corresponding to the extended 2D plasmon interacting with the background plasmons in the presence of a conducting surface. The dispersion equation of a double quantum well is obtained and we show how the split symmetric and antisymmetric modes are formed and modified by the localized surface plasmon. For a single layer, we show that when a one-dimensional (1D) periodic electrostatic potential is applied to the surface, each of the symmetric and antisymmetric modes will be further split by the interaction with the 1D modulation, leading to folding of plasmon dispersion curves for different modes. For double layers, we show that the coupled 2D and surface plasmons may result in radiated energy. Our analysis is based on a calculation of the surface response function obtained using a transfer matrix method.

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