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Minigap plasmons in a two-dimensional electron gas modulated by a one-dimensional periodic potential HIROYUKI SAKAKI, Institute of Industrial Science, University of Tokyo, Japan, MANVIR KUSHWAHA, Institute of Physics, University of Puebla, Mexico — We investigate the plasmon excitations in a two-dimensional electron gas (2DEG) subjected to a one-dimensional (1D) weak periodic potential. We derive and discuss the dispersion relations for both intrasubband and intersubband excitations within the framework of Bohm-Pines' random-phase approximation (RPA). For such an anisotropic system with spatially modulated charge density, we observe a splitting of the 2D plasmon dispersion. The splitting is caused by the superlattice effect of the charge-density modulation on the collective excitation spectrum. Several illustrative examples are presented on the computed plasmons excitation energy as a function of the propagation vector as well as the Bloch vector. We also discuss how the tunneling and the potential amplitude influence the minigaps and the plasmon excitations.

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