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Hermitian Two-band Model for One-dimensional Plasmonic Crystals YUJI KITAMURA, SHUICHI MURAKAMI, Department of Physics, Tokyo Institute of Technology — Surface plasmon polaritons form band structure when the metal surface is periodically corrugated. Such a microscopic structure of metal surface is called the plasmonic crystal. We theoretically study the plasmonic band structure of 1D plasmonic crystals. Although a similar work was reported previously, the eigenvalue equation is non-hermitian. Such a non-hermitian eigenvalue equation has essential difficulties because their eigenvalues may be complex, and we cannot apply the perturbation theory. To avoid such difficulties, we started from the plane wave solution of the Maxwell's equation and consider the small corrugation as a perturbation to the lowest two bands. In this manner, the eigenvalue equation is derived from the matching conditions for electromagnetic fields at the interface. We show that the derived eigen equation is hermitian and analogous to the usual two-band model for electrons. We also show that the wave number and corrugation dependences of the solution behave like the band theory of electrons in solids.

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