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Resonant transparency of materials with negative permittivity[1]
A. SMOLYAKOV, University of Saskatchewan, Saskatoon, S7N 5E2 Canada, E. FOURKAL, Fox Chase Cancer Center, Philadelphia, PA 19111 — It is shown that the transparency of opaque material with negative permittivity exhibits resonant behavior. The resonance occurs as a result of the excitation of the surface waves at slab boundaries. Dramatic field amplification of the incident evanescent fields at the resonance improves the resolution of the the sub-wavelength imaging system (superlens). A finite thickness plasma slab can be totally transparent to a p-polarized obliquely incident electromagnetic wave for certain values of the incidence angle and wave frequency corresponding to the excitation of the surface modes. At the resonance, two evanescent waves have a finite phase shift providing non-zero energy flux through the non-transparent region. In a warm plasma case, the excitation of the propagating longitudinal (electrostatic) modes becomes possible. The longitudinal excitations facilitate the total transparency of an opaque plasma slab creating additional resonances in the transmission function of the system.

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