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Optical Bulk and Surface Waves with Negative Refraction

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At optical frequencies the introducing of $\mu(\omega)$ has no physical sense [1]. Using a general approach with a dielectric permittivity $\tilde{\varepsilon}(\omega, \vec{k})$, we discuss [2] unusual optical nonlinear effects in LHMs and the possibility of seeing negative refraction for optical waves in continuous nonmagnetic media: bulk and surface waves in vicinity of exciton and optical phonon resonances where additional polariton waves [3] have a negative group velocity. The dispersion of surface waves can be engineered by tailoring a surface transition layer [4] to obtain surface waves with negative group velocity. We discuss also a negative refraction in anisotropic transparent media. 1. L.D.Landau, E.L. Lifshits, Electrodynamics of Continuous Media, Pergamon Press,1984. 2. V.M. Agranovich, Y.R. Shen, R.H.Baughman, A.A. Zakhidov, Phys. Rev. B 69 (2004) 165112; Journal of Lumin., December (2004). 3. V.M. Agranovich, V.L. Ginzburg, Crystal Optics with Spatial Dispersion, and Excitons, Springer, 1984. 4. V.M. Agranovich, T.A. Leskova, Progress in Surface Science, 29 (1988) 169.