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Nonlinear and nonlocal effects on dispersion relation for surface plasmon at a metal/Kerr medium interface[1] RAILING CHANG, Institute of Optoelectronic Sciences, National Taiwan Ocean University, Keelung, Taiwan, ROC, JUNG-HAO HUANG, Department of Electronic Engineering, Oriental Institute of Technology, Taipei, Taiwan, ROC, PUI-TAK LEUNG, Department of Physics, Portland State University, Portland, Oregon, USA — We present an analytical calculation for the dispersion relation of SP at a metal/Kerr medium interface where the metal is treated by local (Drude) as well as nonlocal (hydrodynamic) models for comparison. In the local model the dispersion relation exhibits prominent change as the field intensity increases, with SP frequency for large wave number shifted negatively (positively) for positive (negative) Kerr coefficient (KC). As the intensity increases to certain critical value, the negative KC results in the disappearance of SP mode. In the nonlocal model, all the nonlinear phenomena observed continue to exist but are significantly weakened, indicating that nonlinearity and nonlocality are two mutually counteracting effects.

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