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Ginzburg-Landau equation bound to the metal-dielectric interface and transverse nonlinear optics with amplified plasmon polaritons

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Using a multiple-scale asymptotic approach, we have derived the complex cubic Ginzburg-Landau equation for amplified and nonlinearly saturated surface plasmon polaritons propagating and diffracting along a metal-dielectric interface. An important feature of our method is that it explicitly accounts for nonlinear terms in the boundary conditions, which are critical for a correct description of nonlinear surface waves. Using our model we have analyzed filamentation and discussed bright and dark spatially localized structures of plasmons.

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