



Analytical Study of Sub-Wavelength Imaging by Uniaxial Epsilon-Near-Zero Metamaterial Slabs

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We discuss the imaging properties of uniaxial epsilon-near-zero metamaterial slabs with possibly tilted optical axis, analyzing their sub-wavelength focusing properties as a function of the design parameters. We derive in closed analytical form the associated two-dimensional Green's function in terms of special cylindrical functions. For the near-field parameter ranges of interest, we are also able to derive a small-argument approximation in terms of simpler analytical functions. Our results, validated and calibrated against a full-wave reference solution, expand the analytical tools available for computationally-efficient and physically-incisive modeling and design of metamaterial-based sub-wavelength imaging systems.

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