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Title:Optical activity of metallic helices in the terahertz domain: A theoretical investigation
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Abstract:Optical activity in the terahertz spectral domain has recently seen a growing interest, but fine understanding of these phenomena is not yet developed. In this article, we study analytically the response of a metallic helix in the terahertz regime and present a full nonlocal calculation of its chiroptical response. Because we do not use multipolar expansion, this calculation is very general and applies to the case where the helix size is comparable to the wavelength of the light. We calculate the circular birefringence and dichroism in three configurations: propagation along or perpendicular to the helix axis and response of an isotropic distribution of such helices. We obtain analytical expressions and can examine the consequence of the breakdown of the multipolar expansion and the wavelength-dependence of the chiroptical response, as well as give orders of magnitude that compare favorably with experimental data. This calculation is also comforted by a finite element calculation. © 2012 Optical Society of America.
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