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Computational Study on the Magneto-optical Effects from Gyrotropic Gratings. MIN HYUNG CHO, YUE HUI LU, Y. P. LEE, Quantum Photonic Science Research Center, Hanyang University, Seoul, Korea, JOO YULL RHEE, BK21 Physics Research Division and Institute of Basic Sciences, Sungkyunkwan University, Suwon, Korea — Maxwell's equations with non-diagonal complex dielectric tensor are numerically studied for the calculation of Magneto-optical(MO) effects from one-dimensional lossy gyrotropic or magnetic gratings. Owing to the periodicity of the structure, the dielectric tensor is expanded out in Fourier series and the electric and the magnetic vectors are written in terms of Bloch wave. Then, Maxwell's equations are simplified as a system of ordinary differential equations, and the solutions can be simply written in terms of exponential function with the eignevalue of system times the initial value. Finally, by considering the multiple reflection in the grating structure with Airy-like internal reflection series, the reflection and the transmission matrices are obtained and used to calculate the MO effect. The Kerr rotations of the 0th and the 1st diffracted orders are calculated as a function of various parameters. The calculated results agree excellently with the experimental data for permalloy gratings. This method can also be used for many interesting applications and easily extended to two-dimensional gratings.

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