

Diffraction Efficiency Of Gratings With Sinusoidal Profile

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Abstract

The aim of this study is to compare the diffraction efficiency of a sinusoidal diffraction grating numerically calculated using COMSOL Multiphysics® with the measured results performed with a custom-made equipment and calculations using Bessel functions. A diffraction grating with the period of 860 nm and thickness of approximately 120-140 nm was prepared by hot embossing in As₂₀Se₈₀ layer (see fig. 1).

The custom-made equipment consists of a laser LED diode source, a rotation sample stage with independent adjustment of angle of incidence/diffraction angle, and a photodiode detector (see fig. 2). The calculated diffraction efficiency using Bessel functions agrees satisfactorily with the measured results (see fig. 3).

Firstly, results obtained by utilization of Plasmonic Wire Grating application using COMSOL Multiphysics® will be compared with previous results. As a next step, simulation using COMSOL Multiphysics® Wave Optics Module will be performed in order to assess the effect of the grating profile and thickness on modeled as well as measured results.

References

[1] P. Hariharan, "Optical Holography: principles, techniques, and applications," Cambridge Studies in Modern Optics, second Edition, p. 47 (1996).

Acknowledgments

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Figures used in the abstract

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Figure 1 : AFM of grating profile

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Figure 2 : Custom-made equipment for measuring of diffraction efficiency

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Figure 3 : Comparison of measured diffraction efficiency with theoretical calculation [1].