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Bi-directional Scatter Distribution Function (BSDF) Measurements of Guided Mode Resonance Filter Optical Limiters ROBERT LAMOTT, MICHAEL MARCINIAK, Air Force Institute of Technology, BRIAN CUNNINGHAM, University of Illinois at Urbana-Champaign — Guided Mode Resonance Filters (GMRF) are 2- and 3-D photonic-crystal structures designed to provide a specific photonic band gap. This narrow stop band makes it a suitable candidate for dealing with laser illumination directed at optical sensors, protecting the sensor while allowing the sensor to continue collecting other wavelengths. Since absorbing light is not their primary method of filtering, GMRFs are even suitable for higher power lasers, which may cause thermal damage and failure in an absorptive chromatic filter. However, investigation into where the light is scattered, both through the filter and reflected off of the filter, is necessary to ensure scatter is not damaging other elements of the sensor or other nearby sensors. We analyzed three GMRF samples designed for different wavelengths, using a Complete Angle Scatter Instrument (CASI) to provide in-plane measurements of the strength of the scatter in all transmitted and reflected angles. This data is used to generate Bi-directional Scatter Distribution Functions (BSDFs), which can be either physically or empirically based, to model the reflected and transmitted scatter for all incident angles.

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