

Abstract Submitted  
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**Non Specular Diffractive Optics** YUNJIN WANG<sup>1</sup>, DAN OVERCASH, PAWEL MORAWICE, Univ. South Carolina, MING YIN, Benedict College, SC 29204, TIMIR DATTA, Univ. South Carolina — Geometrically decorated two-dimensional (2D) discrete surfaces can be more effective than conventional smooth reflectors in managing wave radiation. Constructive non-specular wave scattering permits the scattering angle to be other than twice that of incidence and can result in gross violations of the law of reflection. A wide range of novel reflective behaviors ensues; including the phenomenon of negative reflection where energy transport remains on the same side of the normal. Also, at a critical incidence coherent superposition can force both the transmitted and reflected waves to graze the scattering surface thus synergistically reinforcing the diffractive process in a behavior reminiscent of critical internal reflection of ray optics. We experimentally demonstrate the concept with measurements on a one-dimensionally periodic system (grating) where the scattering angle is shown to be an inverse circular function of a function that depends on the diffractive index and the two angles. Excellent agreement is found between experimental data and theory. A preliminary report on our observations will be discussed.

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