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# Exact Geometrical Optics Scattering by a Class of DNG Metamaterial Wedges Under Multiple Plane Waves Illumination

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Exact geometrical optics (GO) scattering by structures containing wedges with sharp edges that separate different materials is possible only if the scattering by the edges can be muted. This goal cannot be achieved under incidence by a single plane wave on a wedge made of perfect electric or perfect magnetic material, but it is possible under certain conditions involving more than one incident plane wave [1-2]. If penetrable materials are present, it is also possible in certain cases to obtain an exact GO solution (see, e.g., [3-8]); however, the only known case in which this occurs under a single plane wave incidence is that of a right-angle anti-isorefractive DNG metamaterial wedge when the incident wave illuminates both faces of the wedge [7], otherwise three incident plane waves are needed to avoid scattering by the edge. Recently, the case of a wedge with a π/4 radian aperture angle, made of anti-isorefractive DNG metamaterial and immersed in free space, has been studied; it was determined that three incident plane waves are needed to avoid scattering by the edge of the wedge if one of the waves illuminates both wedge faces, otherwise five waves are needed [9].

In this work, an anti-isorefractive DNG metamaterial wedge with an aperture angle of π/(2n) radian (n integer) and immersed in free space is considered. The number and properties of the plane waves needed to avoid edge scattering and ensure the existence of an exact GO solution is determined. The analysis is conducted in the phasor domain. The result obtained represents a novel solution to a canonical boundary-value problem, and it may be useful in the validation of computer codes.

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