

Corner cube retroreflector with a spiral phase structure generating annular far-field diffraction pattern

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The importance of the far-field diffraction pattern (FFDP) for retroreflectors lies in its ability to describe the performance of retroreflectors commonly used for positioning or measurement in optical systems. We proposed a new, to the best of our knowledge, retroreflector structure integrating a metal-coated corner cube retroreflector (CCR) and a spiral phase plate (SPP) to produce an annular FFDP. We analyzed the propagation characteristics of the light beam traveling through this combination and described the mechanism underlying the generation of an annular FFDP. We developed a simulation program to calculate the far-field pattern for various critical parameters of the spiral phase CCR and experimentally demonstrated its annular FFDP.