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Apodized Volume Bragg Gratings SERGIY MOKHOV, CREOL - the College of Optics and Photonics, Univ. of Central Florida — Reflective and transmissive volume Bragg grating (VBGs) are widely used in high power laser applications because of their large operational aperture and robustness. They are fabricated in photosensitive material through holographic recording of uniform interference pattern of two overlapping coherent waves obtained by splitting a flat-top shaped laser beam. The following thermal treatment produces permanent refractive index modulation (RIM). Reflective VBGs have fringes parallel to operational anti-reflective coated surfaces and they demonstrate narrow reflection bandwidth. Transmissive VBGs are cut with fringes perpendicular to surfaces and they are characterized by narrow angular selectivity. Uniform RIM causes secondary lobes in corresponding reflection and transmission spectra due to sharp boundary conditions for volume Bragg diffraction. We propose to create apodization of RIM by recording two interference patterns with slightly different parameters in the same volume which would create slow varying moire envelope of amplitude of RIM. Cutting the specimen at zeros of moire envelope with one sine semi-period thickness will produce VBGs apodized at sides which will reduce parasitic secondary lobes in spectra. In reflection geometry, two patterns of the same orientation with slightly different periods are required for apodization along Bragg wave vector. In transmission case, recording of the same interference patterns with small mutual rotation angle provides apodization in direction perpendicular to Bragg wave vector. Modeling results show significant improvement in selective properties of VBGs with such moire apodization.

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