2-Dimensional beamsteering using dispersive deflectors and wavelength tuning

Trevor Chan,[1,*] Evgeny Myslivets,[1] and Joseph E. Ford,[1]

[1]*Department of Electrical and Computer Engineering, University of California, San Diego, 9500 Gilman Dr. La Jolla, CA 92093, USA*

[*]*Corresponding author: tkc@ucsd.edu*

Abstract: We introduce a 2D beamscanner which is controlled by wavelength tuning. Two passive dispersive devices are aligned orthogonally to deflect the optical beam in two dimensions. We provide a proof of principle demonstration by combining an arrayed waveguide grating with a free space optical grating and using various input sources to characterize the beamscanner. This achieved a discrete 10.3° by 11° output field of view with attainable angles existing on an 8 by 6 grid of directions. The entire range was reached by scanning over a 40 nm wavelength range. We also analyze an improved system combining a virtually imaged phased array with a diffraction grating. This device is much more compact and produces a continuous output scan in one direction while being discrete in the other.

OCIS codes: (060.2605) Free-space optical communications; (050.1970) Diffractive optics; (080.1238) Array waveguide devices.

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1. Introduction

Free-space optical (FSO) communications provide a communication link by encoding information in a laser beam between the points of communication. A FSO communication link is sometimes chosen over RF wireless communications because the nature of the laser allows secure, high-bandwidth wireless links. However, an additional complexity in establishing a communication link is that the optical beam must be aimed to its targeted receiver. This is routinely accomplished between stationary nodes[1] where large angle, active alignment is not required.

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