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Data Encoding on Continuous Wave THZ Signals for Sensing
KE SU, ZHIWEI LIU, Department of Physics, New Jersey Institute of Technology, Newark, NJ 07102 , LOTHAR MOLLER, Bell Laboratories, Alcatel-Lucent, 791 Holmdel-Keyport Rd, Holmdel, NJ 07733, USA, JOHN F. FEDERICI, Department of Physics, New Jersey Institute of Technology, Newark, NJ 07032 — The intrinsic advantages of potentially ultra-high bandwidth, unrestricted frequency bands, and relative secure channels lead to a steadily increasing interest in THz communications. Other than for communication purposes, data modulation on THz signals could find application in sensing. When imprinting code sequences on pulse trains, ranging information from far distance scattering objects can be obtained to define selective measurement intervals. This technique is known from M-sequence radar where digital beam modulation enhances the system's unambiguous range. In this paper we describe a method for encoding continuous wave THz radiation via rapid, voltage controlled phase modulation. An electro-optic phase modulator is used to directly modulate the THz wave through a 2π phase shift. While data rates in the MB/s range are demonstrated, the method should be capable of data transmission rates in the hundreds of MB/s range. Applications of the data modulation to sensing applications will be discussed.

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