Abstracts

Broad-band linearization of a Mach-Zehnder electrooptic modulator

E.I. Ackerman. "Broad-band linearization of a Mach-Zehnder electrooptic modulator." 1999 Transactions on Microwave Theory and Techniques 47.12 (Dec. 1999 [T-MTT] (Special Issue on 1999 International Microwave Symposium)): 2271-2279.

Analog optical-link dynamic range in excess of 75 dB in a 1-MHz band has been achieved using specially designed electrooptic modulators that minimize one or more orders of harmonic and intermodulation distortion. To date, however, such "linearized" modulators have only enabled improved link dynamic ranges at frequencies below 1 GHz. Additionally, linearization across more than an octave bandwidth has required precise balancing of the signal voltage levels on multiple electrodes in a custom modulator, which represents a significant implementation challenge. In this paper, a link linearization technique that uses a standard Mach-Zehnder lithium-niobate modulator with only one RF and one dc-bias electrode to achieve broad-band linearization is discussed, resulting in a dynamic range of 74 dB in 1 MHz across greater than an octave bandwidth (800-2500 MHz). Instead of balancing the voltages on two RF electrodes, the modulator in this new link architecture simultaneously modulates optical carriers at two wavelengths, and it is the ratio of these optical carrier powers that is adjusted for optimum distortion canceling. The paper concludes by describing a second analogous link architecture in which it is the ratio of optical power at two modulated polarizations that is adjusted in order to achieve broad-band linearization.

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