Abstracts

Analysis of the AO-FDPC optical heterodyne technique for microwave time delay and phased array beamsteering applications

W.D. Jemison. "Analysis of the AO-FDPC optical heterodyne technique for microwave time delay and phased array beamsteering applications." 2002 Transactions on Microwave Theory and Techniques 50.7 (Jul. 2002 [T-MTT]): 1832-1843.

This paper presents a theoretical analysis of the application of the acousto-optic frequency-dependent phase compensated (AO-FDPC) optical heterodyne technique for microwave time delay applications and phased array beamsteering. A primary goal of the paper is to resolve open questions that have been associated with this interesting and highly referenced technique. The work presented here quantifies, for the first time, the fundamental time delay performance bounds of this technique in terms of the parameters associated with the AO-FDPC acousto-optic (AO) cell and the signal bandwidth. The theory presented in this paper is used to interpret previously reported experimental results that have been subject to debate. Much of the theoretical approach is general and may, therefore, be modified to address the design of new FDPC approaches. Finally, the wide-band beamsteering performance that can be achieved with this technique is quantified in terms of the AO cell parameters and phased array specifications.

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