Abstracts

Design and Analysis of Quasi-Integrated Horn Antennas for Millimeter and Submillimeter-Wave Applications

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The purpose of this paper is to present a systematic process for the design of multimode quasi-integrated horn antennas, and to provide a full range of practical antenna designs for millimeter and submillimeter-wave applications. The design methodology is based on the Gaussian beam approach and the structures are optimized for achieving maximum fundamental Gaussian coupling efficiency. For this purpose, a hybrid technique is employed in which the integrated part of the antennas is treated using fullwave analysis, whereas the machined part is treated using an approximate model. This results in a simple and efficient design process. The developed design procedure has been applied for the design of a 20-, 23-, and 25-dB quasi-integrated horn antennas, all with a Gaussian coupling efficiency exceeding 97%. The designed antennas have been tested and characterized using both full-wave analysis and 91/370GHz measurements. The quasi-integrated horn antennas are also examined as feed elements for Cassegrain antenna systems and are proven to be comparable to the traditional machined corrugated horn feeds.

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