SIW Antenna with Cavity Backed Feature and Integrated Connected U Slot for Satellite Application Band

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Srijita Chakraborty ; Malay Gangopadhyay ; Arunima Samanta ; Pritam Aich ; Ayantika Chakraborty ; Agnideep Goswami **All Authors**

Abstract:
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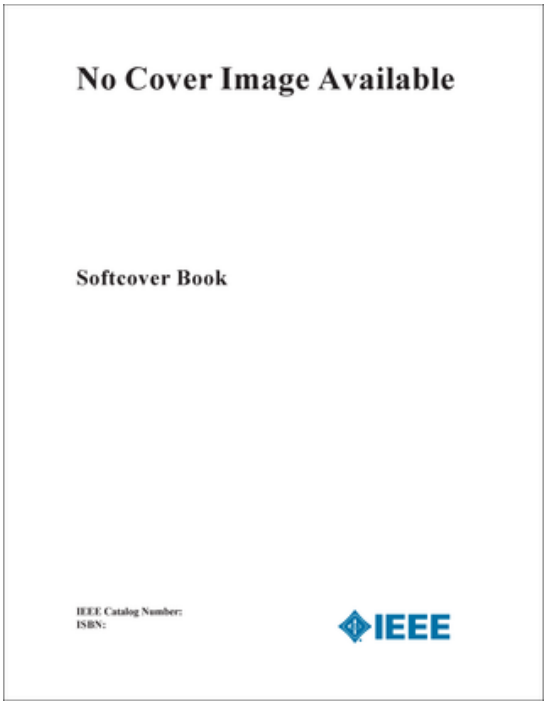

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***Keywords*—Cavity-backed antenna, Satellite Communication Band , SIW ,Connected U Slot**

I. Introduction

Substrate Integrated Waveguide (SIW) [5–14] antenna systems have been attracting much attention in the last decades, because of their high performance figures, ease of mass manufacture, and miniaturisation. Cavity-backed SIW antennas appear to be the best design option among the wide variety of SIW antenna system types that have been developed and fabricated so far, as they increase bandwidth, gain, and radiation efficiency. A cavity back construction with the use of a metal cavity created at the rear of the aperture opening along with the attachment of a rectangular waveguide to the dielectric substrate increases the volume available for propagation and improves the efficiency of the antenna. Using such a design expands the possibilities for regulating the radiation patterns of an antenna's construction in accordance with the intended function.

A large number of applications use cavity-backed SIW antennas. These include applications in the radar systems, satellite communication, wireless local area networks, medical applications, and much more. Owing to the capability of working under harsh conditions outside, the antennas find their perfect usage in the applications of satellite communication systems that require high gain along with a low profile. Increased data rates along with better coverage, particularly indoors, can be achieved through WLAN systems using cavity-backed SIW antennas.

These antennas are used for a variety of applications such as target tracking, surveillance, and remote sensing in radar systems. IVAPs can be constructed using the Wande systems and inserted very skillfully into biological tissues, such as skins, or even imbedded into them.

For a desired radiation performance, it is easy to optimize the cavity-based SIW antenna design process, which includes cavity dimensions, waveguide dimensions, and radiating aperture size. The strength of the antenna, bandwidth, and radiation pattern can all be adjusted by changing these sizes. Moreover, innovative manufacturing techniques and materials can be utilized to further enhance cavity-backed SIW antennas.

Modern small-sized planar antennas for wireless applications are the result of much research into the design and construction of slot antennas. Again, significant research on multiband slotted antennas has been motivated by the need for compact, lightweight, surface mount devices [1–5]. Slotted antennas do, however, have performance limitations for a number of applications. It has been shown that the use of slots with a metal cavity improves the front to rear ratio of the slotted antenna.

This recent trend showed researchers adopting the use of non-linear dielectric waveguides instead of metallic via-holes over a planar substrate. The researchers have designed a slotted cavity-backed antenna of high output power which is optimized for directional radiation and placed within a substrate-incorporated waveguide [6–10]. A dumbbell-shaped