A Flush-Mounted Multiband/Broadband Sinuous-Like Slot Antenna for Terrestrial Communications

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The sinuous antenna was designed to fulfill the need for a broadband antenna that could sense orthogonal states of polarization and be flush mounted, having an overall low physical profile. Originally devised by R. H. DuHamel in 1982, the sinuous antenna satisfied the need with a design whose operation bandwidth was determined by the inner and outer antenna diameters.

Sinuous antennas have since been investigated as a flush-mountable means of achieving multiple polarization states while possessing significantly broad bandwidth. This research has mainly been focused on the traditional, non-slot mode microstrip antennas having high input impedances of several hundred Ohms. The high input impedance and the multi-band operation of this antenna make matching and balancing measures more difficult. Using slot-mode excitation, the input impedance of the same antenna can be lowered (X. Begaud, et al., *Ant. & Prop. Conf.*, 2000), allowing improved matching to feed lines.

This paper will discuss the initial experimental performance of a slot-mode type cavity-backed antenna fabricated on a Duroid® 5880 substrate (shown in Figure 1). An odd-mode pattern, favorable for terrestrial communications, with a null at broadside and maxima at acute angles off broadside (shown in Figure 2) is achieved by appropriate feeding of the input. Return loss, input impedance, and far-field power patterns are examined and will be discussed for this mode at various microwave operating frequencies. Suggestions for possible modifications to improve bandwidth and increase gain including cavity dimensions, antenna dimensions, feeding point location, and feeding point geometry will also be discussed.

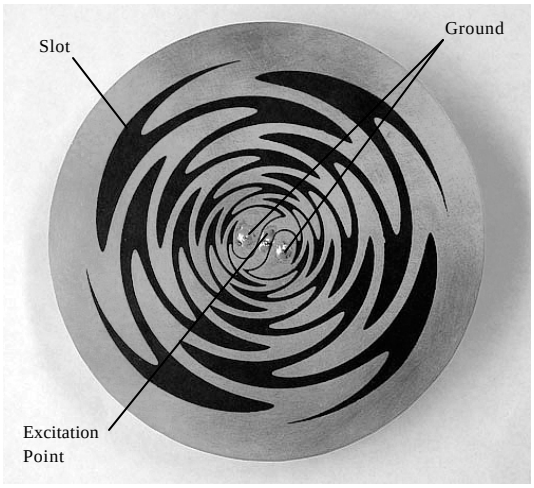

Figure 1 – Photograph of realized antenna

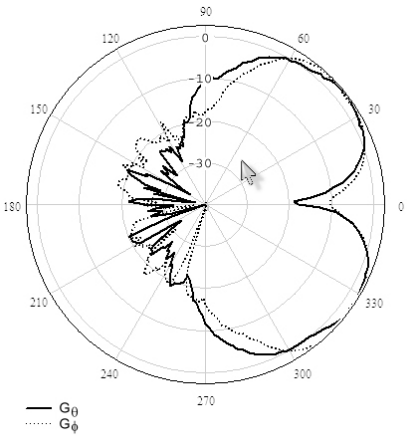

Figure 2 – Power Pattern at 2.5 GHz