Development and Measurement of Conformal Antennas in the VHF/UHF Band

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This advent of engineered low-loss magnetic materials has made it possible to realize antennas of thicknesses approaching $1/50^{th}$ of a wavelength while maintaining performance. Although electrically thin, such antennas are not classified as electrically small as the cross-sectional dimensions are on the order of $1/4^{th}$ of a wavelength or greater at the lowest frequency of operation. This presentation will address the conformal integration of such antennas and the in-suit performance they exhibit after integration into land and Ariel platforms.

Accordingly, this presentation will describe the development of such antennas from the standpoint of simulations and measurement of actual performance. The realization of the antennas is generally comprised of a shallow conductive cavity with magnetodielectric materials sandwiched between the bottom (ground plane) and the upper planar radiating elements. Using an iterative simulation process, it is possible to realize first-cut designs that approach performance goals relative to commercial products of significantly higher profile. The simulations include the curvature needed for integration onto a platform.

The presentation shows the design space for these antennas and the useful frequency range. In particular, the tradeoffs that consider Snoek's law are explored. Comparison to commercially available equivalent antennas of higher profile will be given.