A Study of the Radiation Characteristics due to Sources on Doubly Curved Surfaces

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Today's aircraft, satellites, and launch vehicles are designed to perform diverse and complex tasks. To meet these communication requirements multiple antennas are mounted on the surfaces of aerospace structures. The antenna characteristics for these antennas are important to determine to ensure proper operation of the communication systems.

For conformal arrays numerical solutions of integral equation formulations for the unknown fields can be used, at least for reasonably small antennas. For certain canonical surfaces, e.g. a circular cylinder or an elliptic cylinder it is possible to obtain a modal solution. But for more arbitrarily shaped bodies other methods have to be used. In this paper an asymptotic high frequency method will be used.

With this method it is possible to analyse both singly and doubly curved convex surfaces. Earlier, this method (combined with MoM) has been used for mutual coupling calculations between apertures on PEC (singly and) doubly curved surfaces. The results have been compared against measured results obtained from a test antenna shaped as a general paraboloid of revolution (GPOR) built at Ericsson Microwave Systems AB in Mölndal, Sweden. The agreement was good (Persson et al., *IEEE AP*, Mar. 2003).

In this presentation another part of the analysis of doubly curved conformal array antennas will be considered, namely the radiation problem. The hybrid method will be used to calculate the radiation pattern due to sources (dipoles and apertures) on the general paraboloid of revolution (GPOR). Measurements of the radiation pattern have been performed at Ericsson Microwave Systems AB in Mölndal, Sweden and the calculated results will be verified against the measured results. The polarisation dependence of the radiation pattern will also be discussed.