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DESIGN AND TEST OF A DEPLOYABLE BROADBAND ANTENNA FOR LOW FREQUENCY SYNTHETIC APERTURE INTERFEROMETRIC RADIOMETRY FROM SMALL SATELLITES

Abstract

This paper addresses the design and test results for a broadband deployable antenna for a CubeSat intended to be used as part of a low frequency synthetic aperture interferometric radiometer system. The focus of this work is the design methodology and experimental results for such an antenna. Passive earth remote sensing at 500 MHz is challenging due to Radio Frequency Interference (RFI) as this frequency band is not in an allocated protected band for such applications. Recent airborne experiments in the polar regions show that at this frequency the RFI levels are such that remote sensing applications are feasible. The RFI environment is not static and here arises the need for a broadband element such that the operating frequency can be adjusted and reduce risk. Deploying multiple low frequency broadband antenna elements from a CubeSat platform is typically difficult due to their form factor. This work presents a novel butterfly antenna element which has S11 < - 5 dB and gain > 1.5 dB from 500 MHz – 1.5 GHz, is capable of being deployed in an array from a CubeSat platform and has a simple deployment mechanism.