

## **Design of a Novel Origami Ultra-wideband Monofilar Antenna**

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This work presents a novel design of reconfigurable ultra-wideband origami monofilar antenna. The study of origami devices has been carried out for years because of their advantages of stowability and reconfigurability. In this work, the proposed ultra-wideband origami antenna can be reconfigured to operate from 1.28 GHz to 4.12 GHz at 3 different heights (ie., states), and their operating bandwidths are respectively 1.28 GHz - 1.64 GHz (25%), 1.64 GHz - 3.56 GHz (74%) and 3.56 GHz - 4.12 GHz (14.6%). Therefore, this antenna can be used in the L and S bands. The simulated realized gains at the 3 states of the antenna are approximately 6 dB (H=271 mm), 8.5 dB (H=147 mm) and 5 dB (H=57 mm). State 2 exhibits right-hand circular polarization (CP) happens from 2.04 to 3.56 GHz (fractional CP bandwidth=54%), while polarizations at the other 2 states are either linear or elliptical are their corresponding operating frequencies.

The presentation at the conference will demonstrate the analysis of the origami base and its folding mechanism. Furthermore, the simulated results of this novel antenna will be reported and compared with previous work. This novel origami monofilar antenna is composed of 2 helices in series with diameters of 50 mm and 25 mm. Although the big helix can be circularly polarized by itself, the smaller helix functions to enhance its CP bandwidth by 46%. The widths of the copper traces that form the two helices are 15 mm and 7.5 mm. The distances from the monofilar to the square ground with a side length of 200 mm is 3 mm. The monofilar is placed at the center of the ground, and fed with an SMA port at one side.

Compared to the previous work of bifilar conical spiral antenna, this work presents a wider CP bandwidth and a simpler feeding structure.