Half-Power Beamwidth of a Self-Adapting Conformal 1 x 4 Microstrip Array

Benjamin D. Braaten*
Masud A. Aziz
Sayan Roy
Sanjay Nariyal

Neil F. Chamberlain
Spacecraft Antennas Group
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA, USA.

Dimitris E. Anagnostou
ECE Department
South Dakota School of Mines and Tech.
Rapid City, SD, USA.

ECE Department
North Dakota State University
Fargo, ND, USA.
Topics

1) Introduction and Background

2) The SELFLEX Array

3) Measurement and Simulation Results

4) Discussion and Guidelines

5) Conclusion
Compact SELF-adapting FLEXible (SELFLEX) Arrays

Overview: this project is investigating the possibility of embedding flexible sensors into the design of a flexible antenna array to compensate for surface curvature.
Short Introduction and Background

Antenna elements on a singly curved surface:

\[ \Delta \phi_n^w = +kL|n| \sin \theta_b \]

The SELFLEX Antenna
Measurement and Simulation Results

Varactor Loaded TL at 2.95 GHz:

SMT voltage controlled varactor phase shifter:
1) Manufactured by Skyworks Solutions, Inc. (part number: SMV1247-079) [3].
2) Printed on a 1.27 mm thick Rogers RT/duroid 6010 substrate (same as the array).

Measurement and Simulation Results

The sensor circuitry:

Flexible resistive sensor

Manufactured by Measurement Solutions Inc. [2]

Measurement and Simulation Results

Testing the flexible strain gauge:

![Image of the flexible strain gauge](image1.png)

Output voltage vs. bend angle:

![Graph showing output voltage vs. bend angle](image2.png)
Measurement and Simulation Results

Varactor Loaded TL controlled by the sensor circuit:

\[ \Delta \phi_n^w = +kL|n| \sin \theta_b \]
The SELFLEX Antenna

The manufactured prototype SELFLEX array:

Printed on a 1.27 mm thick Rogers RT/duroid 6010 substrate.
Measurement and Simulation Results

The prototype SELFLEX array under test:
Measurement and Simulation Results

A prototype SELFLEX array under test:
Measurement and Simulation Results

A prototype SELFLEX array under test:
Conclusion

1) A short intro. and background on conformal antennas was presented.

2) The SELFLEX antenna was introduced.

3) Measurement and simulation results were compared – showing that the HPBW of a 1 x 4 microstrip array could be preserved for various bend angles (flexing).
Questions?

Thank you for listening!

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