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

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Topics

1) Introduction and Background

2) The SELFLEX Array

3) Measurement and Simulation Results

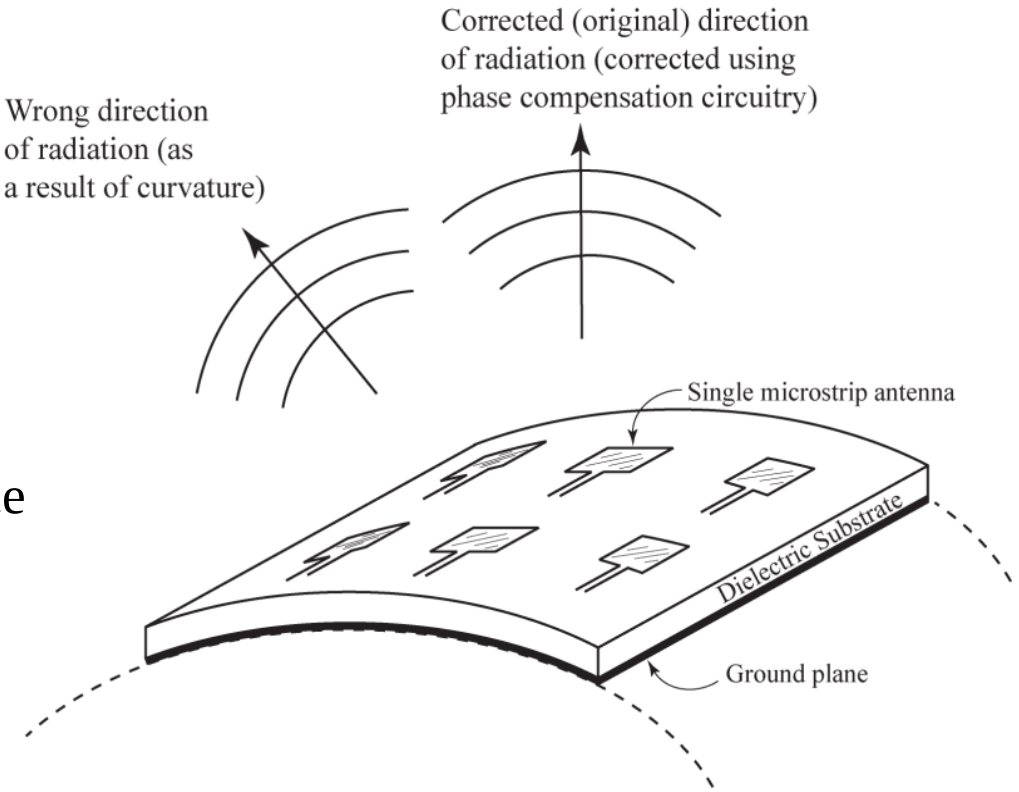
4) Discussion and Guidelines

5) Conclusion

Short Introduction and Background

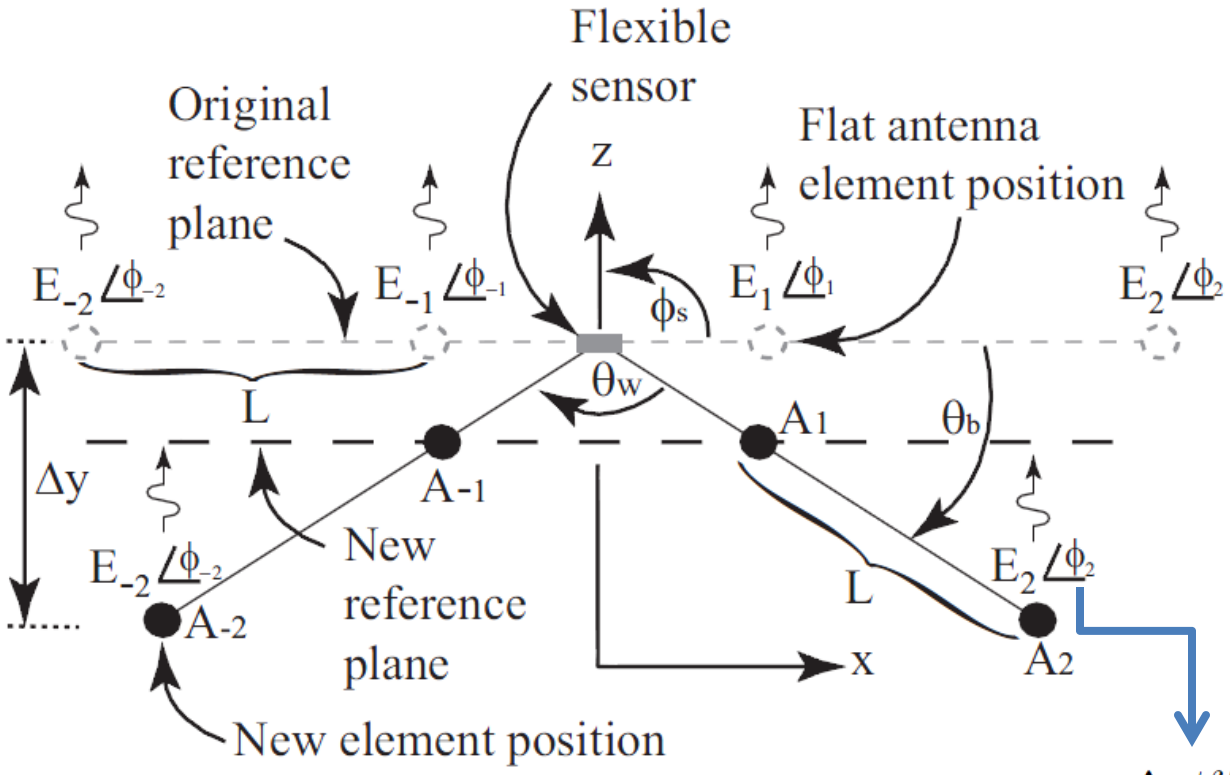
-Compact SELF-adapting FLEXible (SELFLEX) Arrays

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:

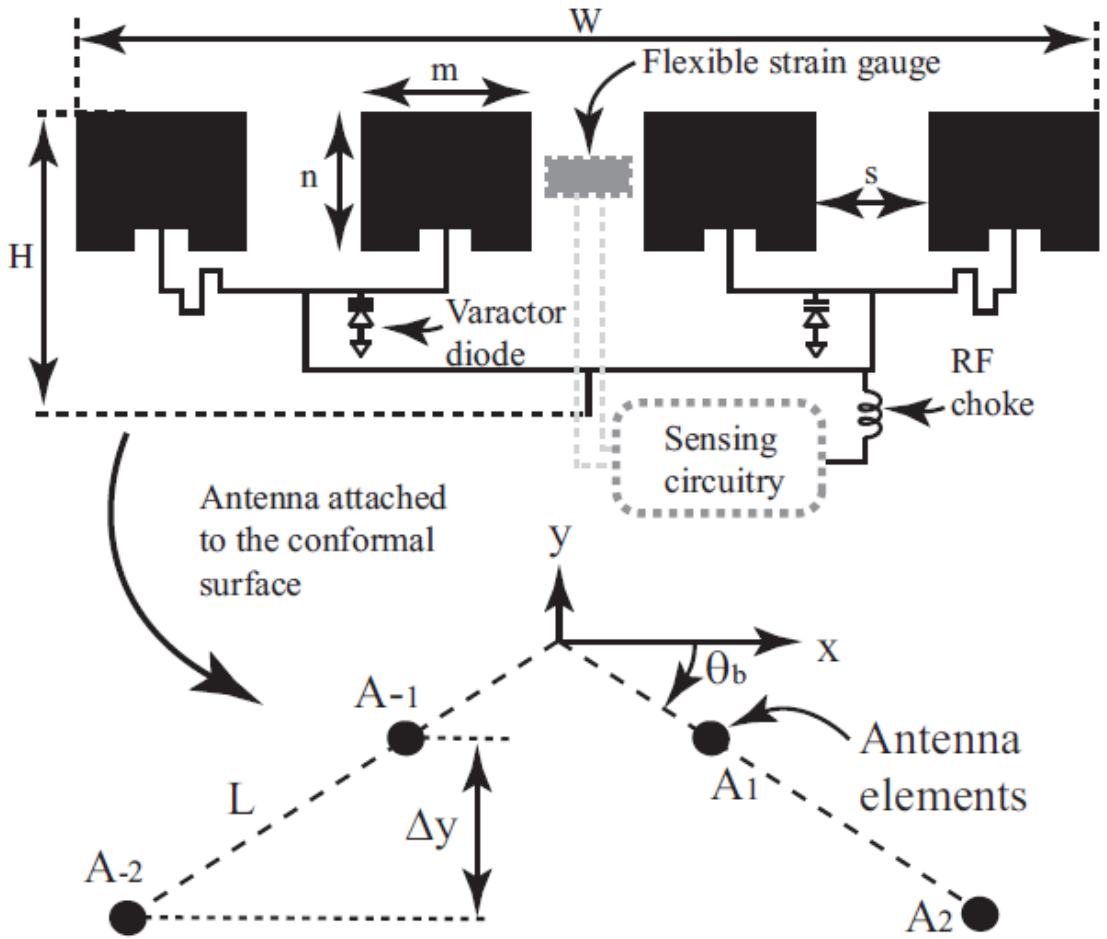


Required phase correction [1]:

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

[1] R. L. Haupt, *Antenna Arrays: A Computational Approach*, John Wiley and Sons, Ltd., Hoboken, New Jersey, 2010.

The SELFLEX Antenna

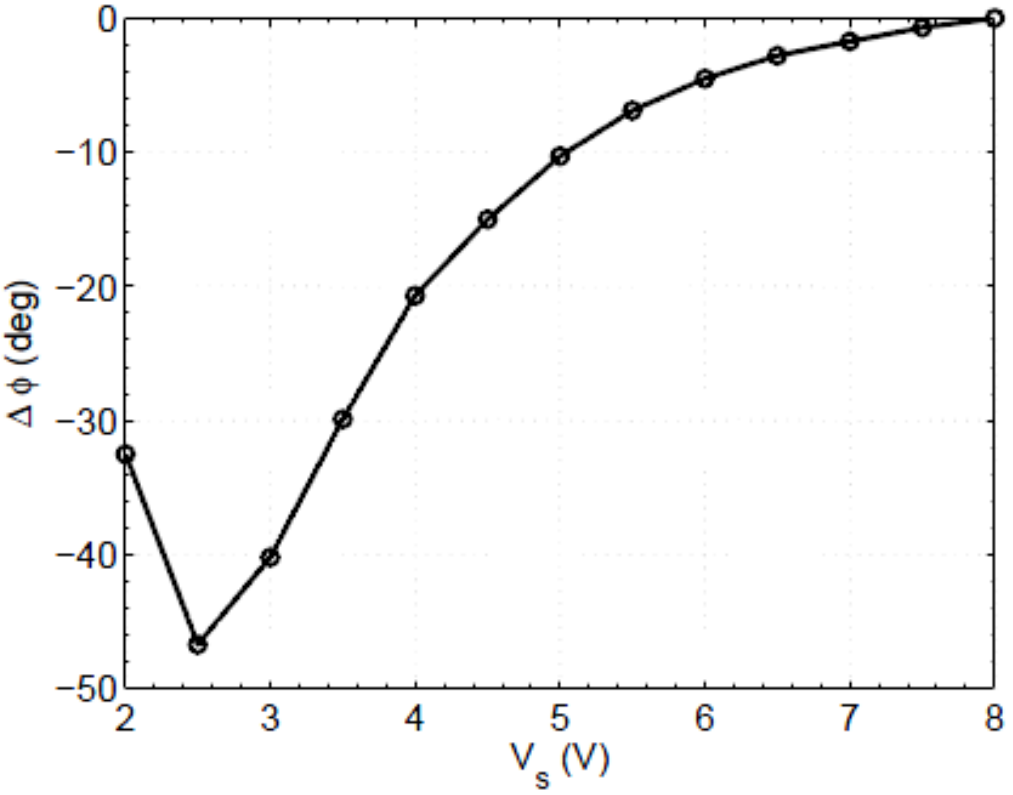


Measurement and Simulation Results

Varactor Loaded TL at 2.95 GHz:

SMT voltage controlled varactor phase shifter:

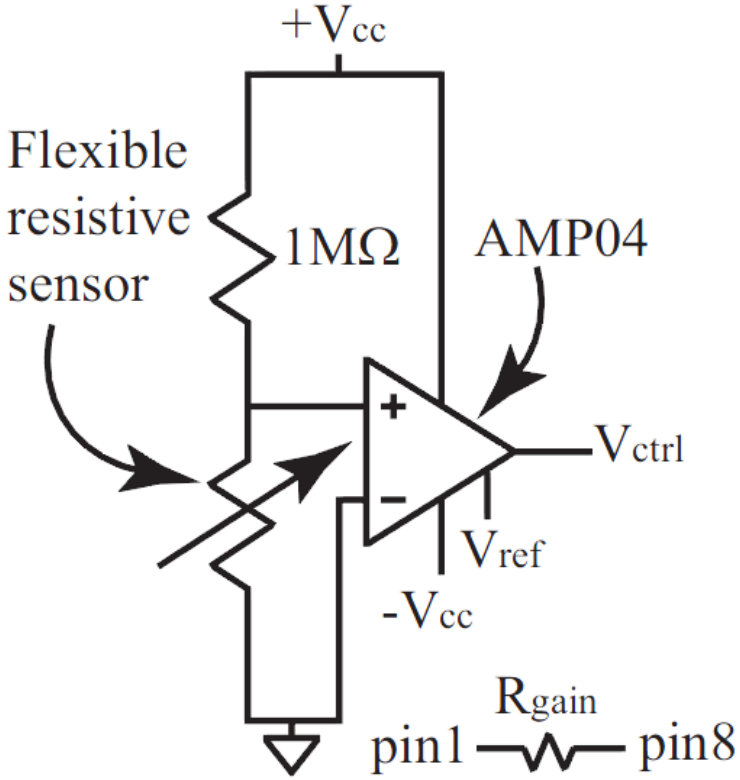
1) Manufactured by Skyworks Solutions, Inc. (part number: SMV1247-079) [3].
2) Printed on a 1.27 mm thick Rogers RT/duroid 6010 substrate (same as the array).

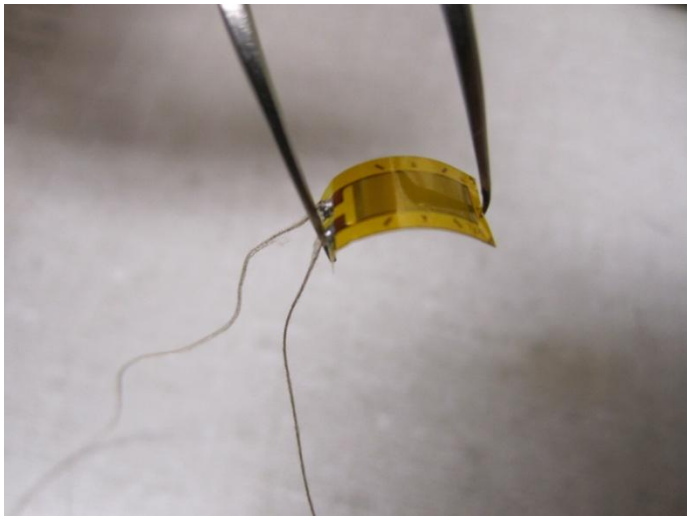


[3] Skyworks Solutions, Inc. www.skyworksinc.com.

Measurement and Simulation Results

The sensor circuitry:



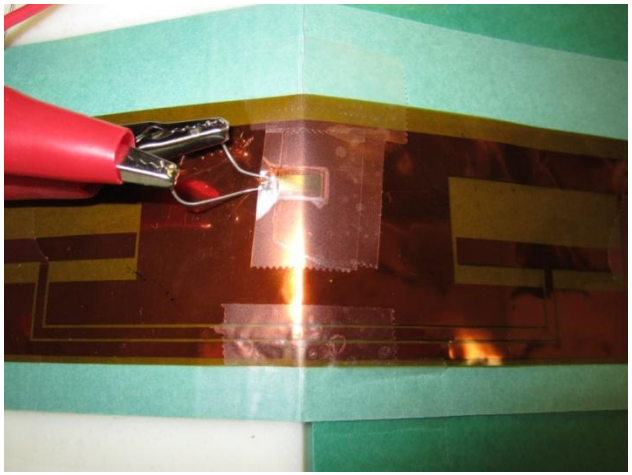


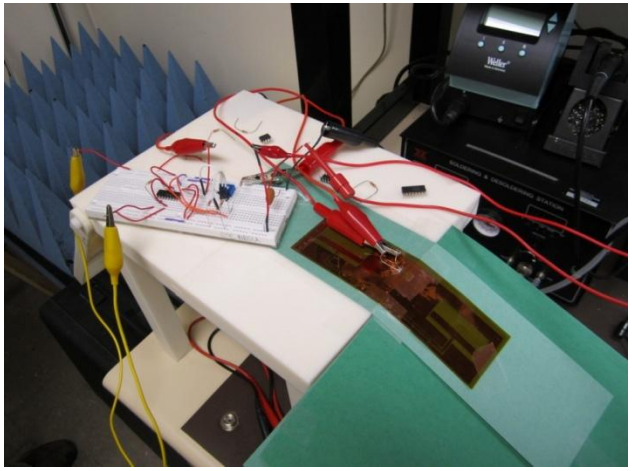
Manufactured by Measurement Solutions Inc. [2]

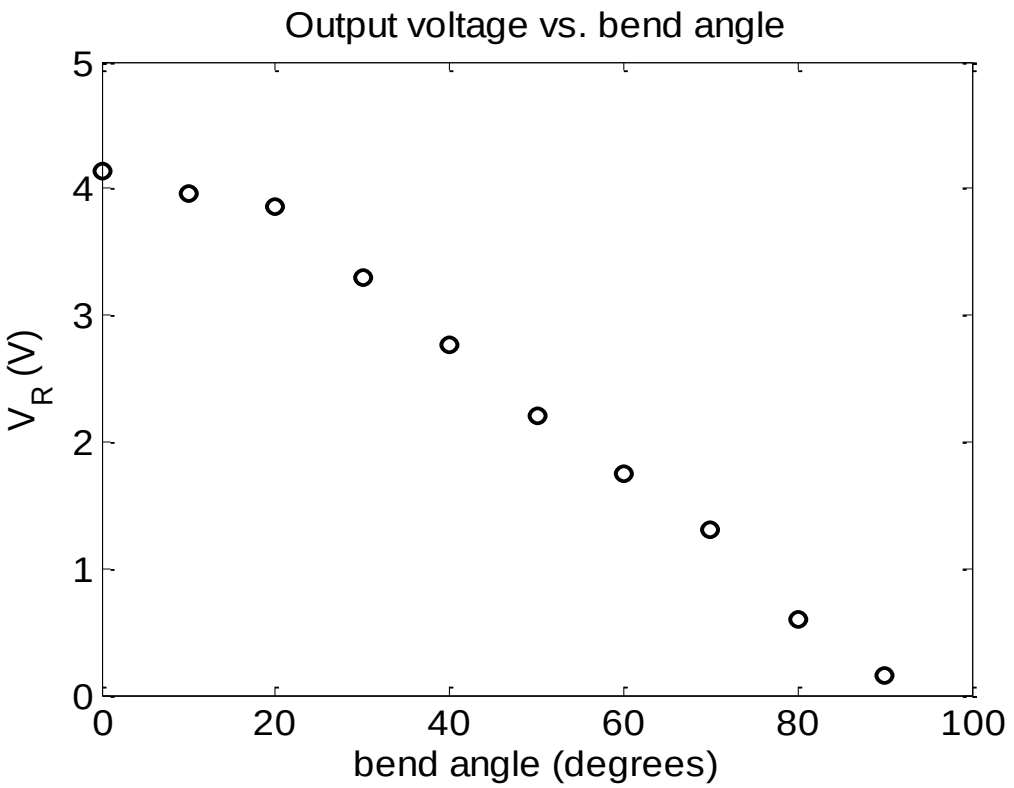
[2] Strain Measurement Solutions, Inc., www.strainmeasurementsolutions.com.

Measurement and Simulation Results

Testing the flexible strain gauge:

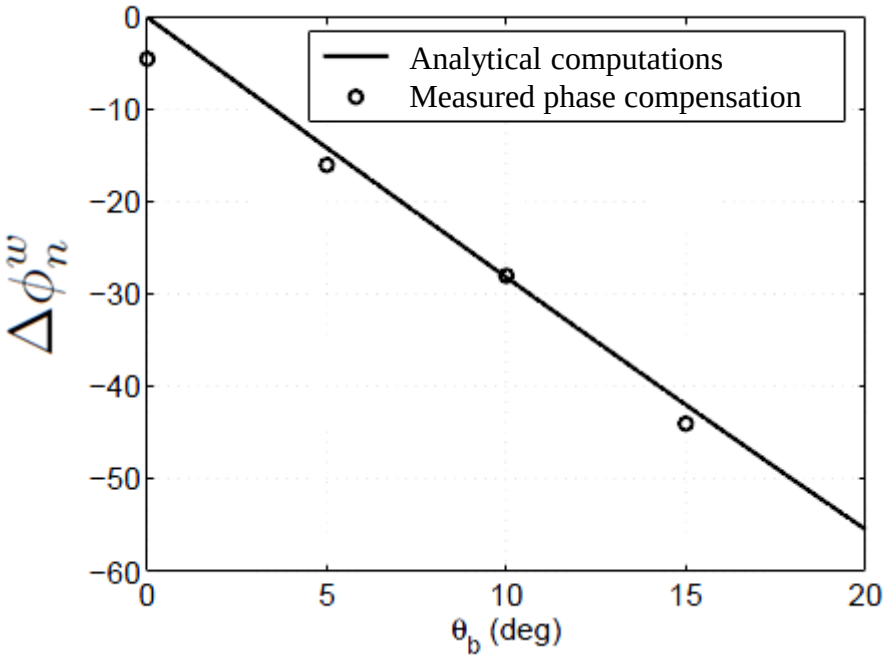






Measurement and Simulation Results

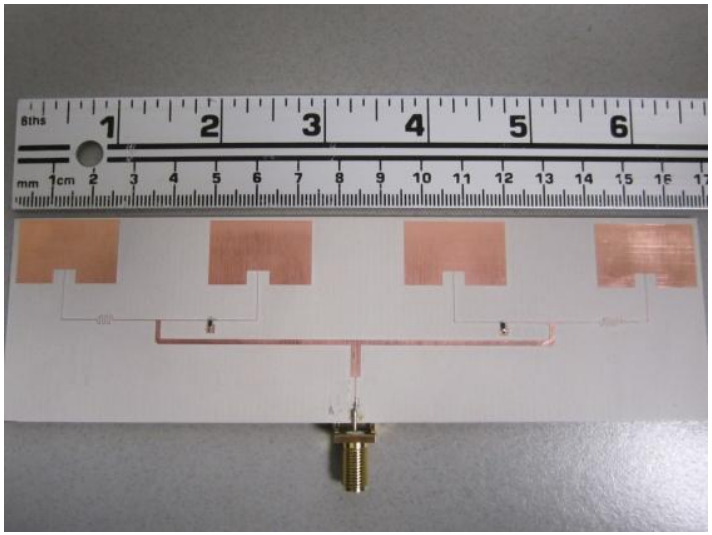
Varactor Loaded TL controlled by the sensor circuit:

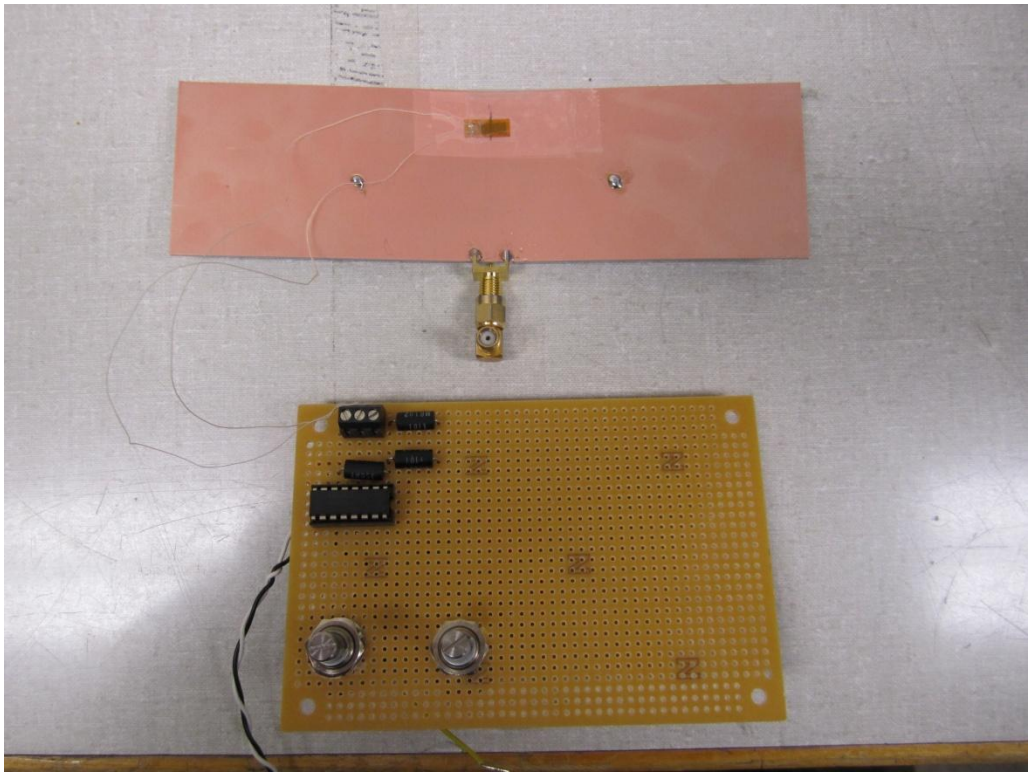


$$\Delta\phi_n^w = +kL|n|\sin\theta_b$$

The SELFLEX Antenna

The manufactured prototype SELFLEX array:

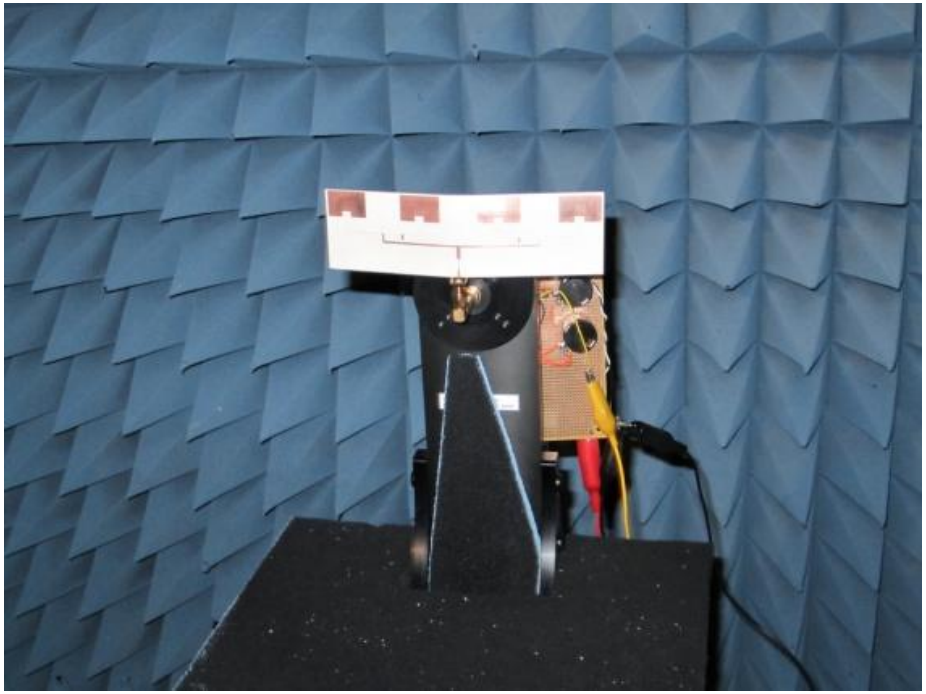


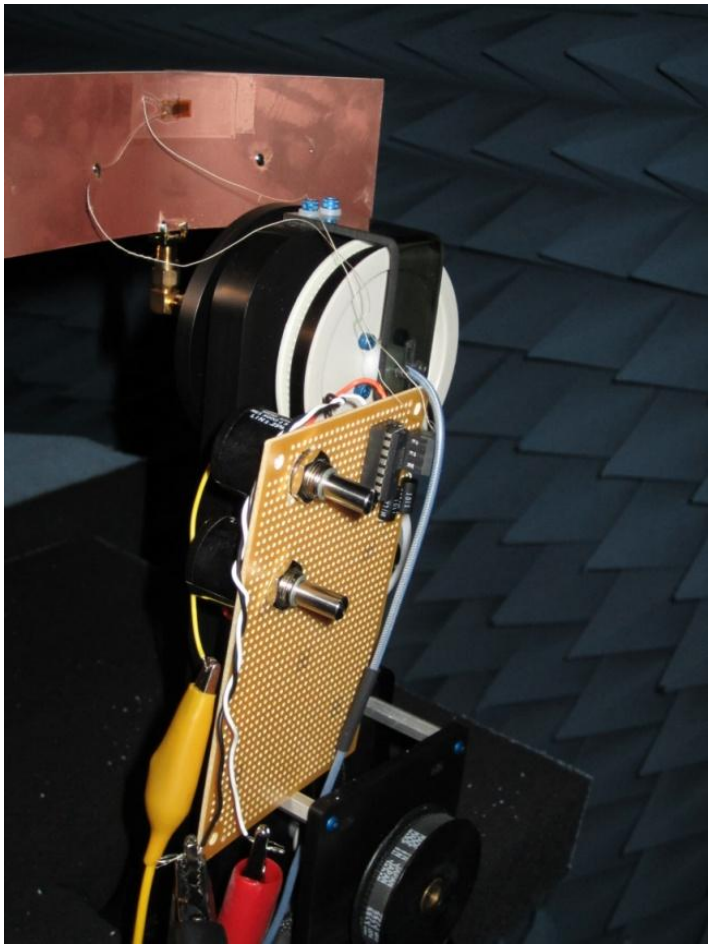


Printed on a 1.27 mm thick Rogers RT/duroid 6010 substrate.

Measurement and Simulation Results

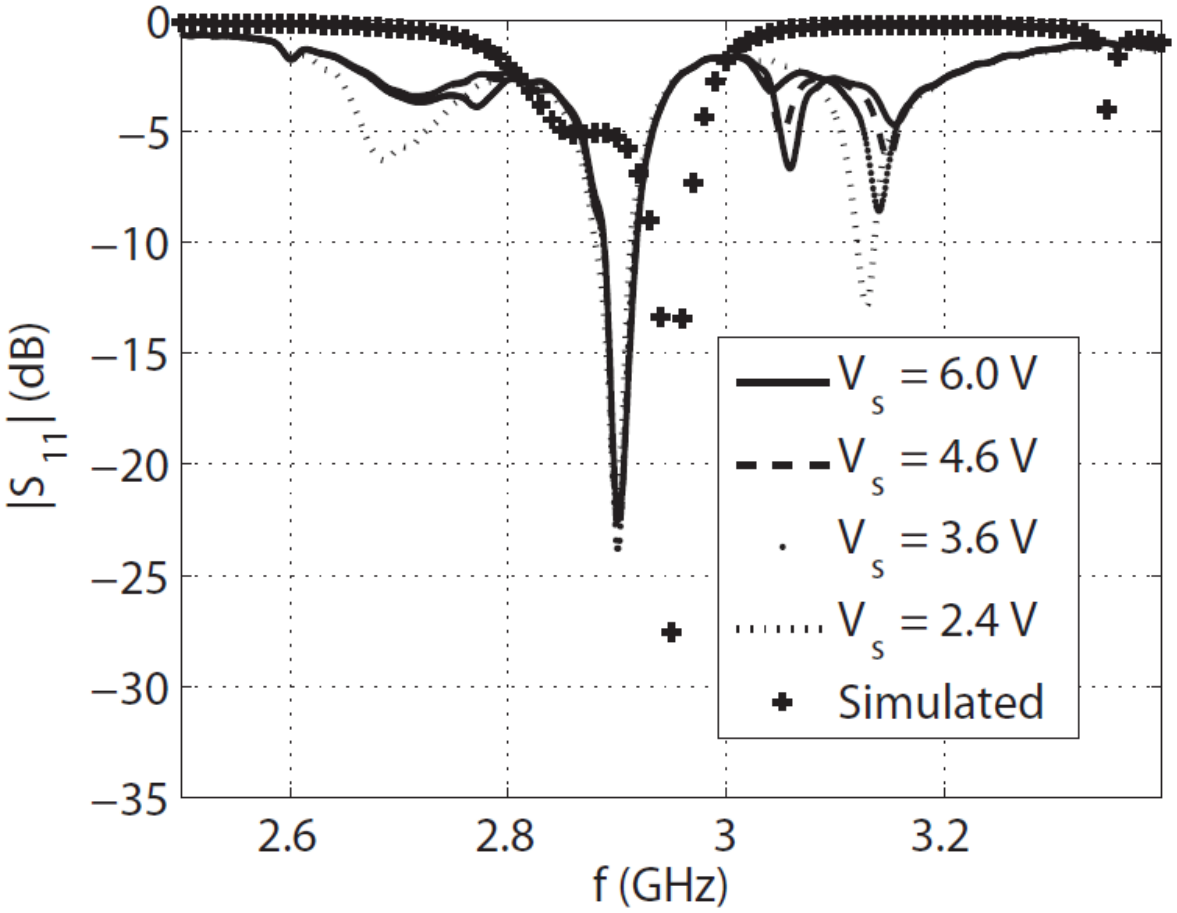
The prototype SELFLEX array under test:





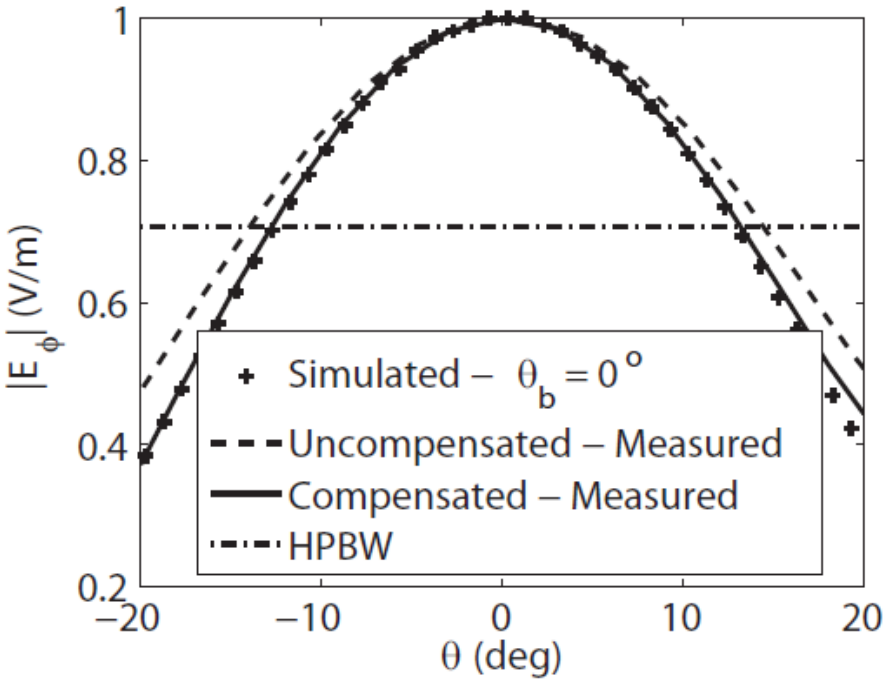
Measurement and Simulation Results

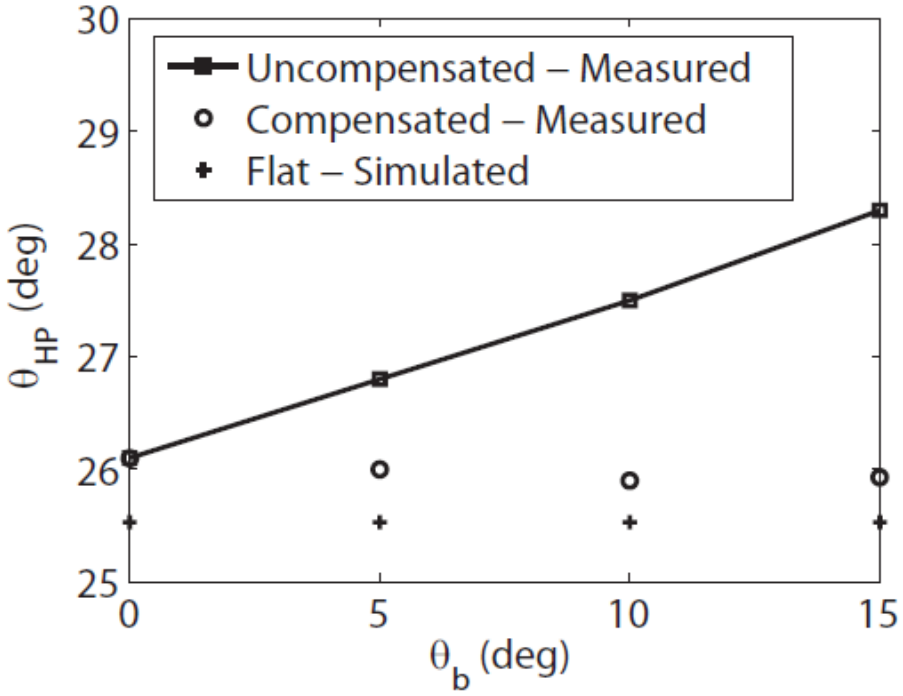
A prototype SELFLEX array under test:



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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