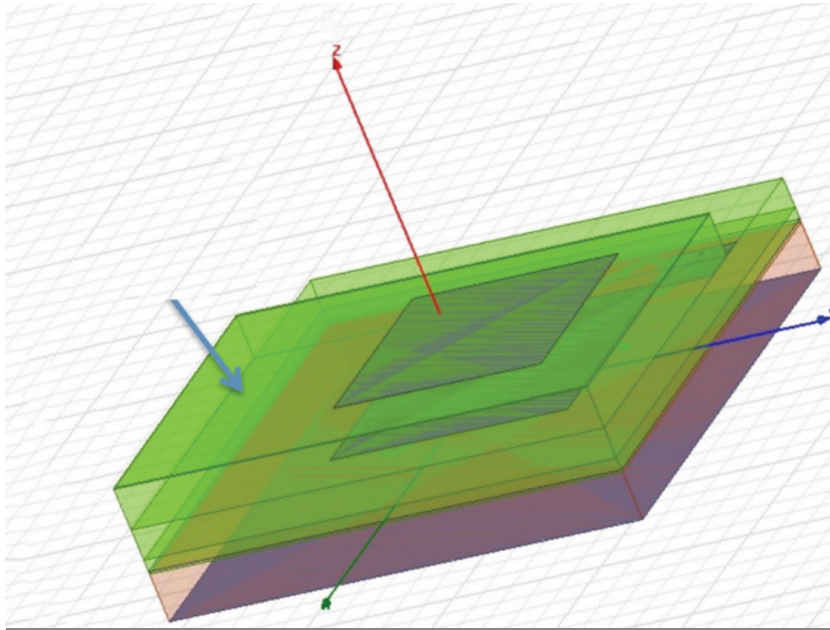


TECHNOLOGY SOLUTION

Communications



Multi- and Wide-Band Single-Feed Patch Antenna

Novel design provides broad-band capability with high signal gain

Researchers at NASA's Marshall Space Flight Center have developed a novel patch antenna technology. This simple antenna design provides significant benefits to NASA satellite communication applications, offering a unique wide-band/multi-band operating capability. For other commercial space or non-space applications, the antenna design also offers broad-band capability with high gain for applications where signal strength, and smaller antenna sizes are important.

The technology was developed to address challenges at NASA created by the need to design antennas for satellites where the target communication frequency is unknown or unassigned.

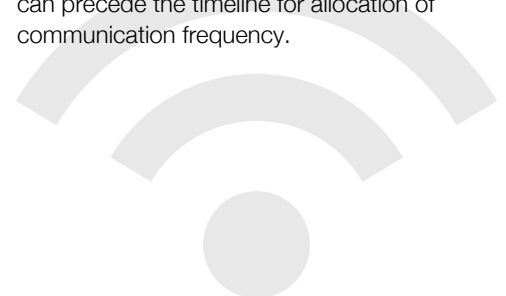
BENEFITS

- The antenna technology is unique in that it offers wide-band operation across multiple frequency bands, with high-gain signal strength and hemispherical coverage.
- The technology offers flexibility in antenna design where specific communication frequencies within a particular band have not yet been assigned.
- The patch design is small and thin and can be easily manufactured in a simple multilayer device.
- Prototype antennas with associated electronics for power and signal management have been validated in operational environments.

APPLICATIONS

The technology has several potential applications:

- The antenna can be used in satellite and terrestrial communications where wide-band operational capability across multiple frequency bands is needed, including situations where the antenna design timeline can precede the timeline for allocation of communication frequency.



THE TECHNOLOGY

NASA's patch antenna technology exhibits higher operational bandwidth (on the order of 20%) than typical patch antennas (less than 10%) and can operate across integer-multiple frequency bands (e.g. S/X, C/X, S/C). Testing of the antenna design has demonstrated > 6dB of gain on both S and X bands (boresight), with an axial ratio of < 6dB and voltage standing wave ratio (VSWR) < 3:1 throughout the entire near-Earth network (NEN) operating bands (22.4GHz and 88.4GHz) with hemispherical coverage. The patch size is on the order of 10 x 10 cm and with associated electronics, is about 1 cm in height.

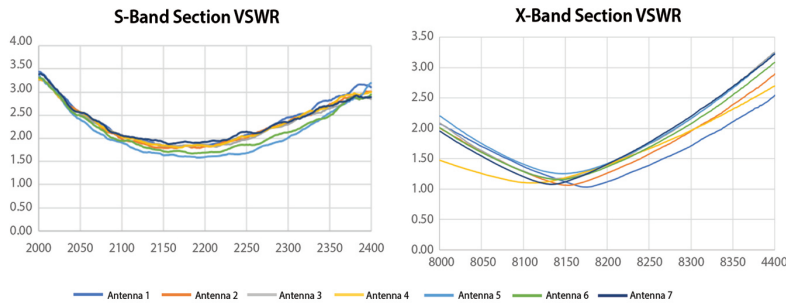


Figure: Typical S-Band VSWR (left) and Typical X-Band VSWR (right)

Anechoic Chamber Antenna Results

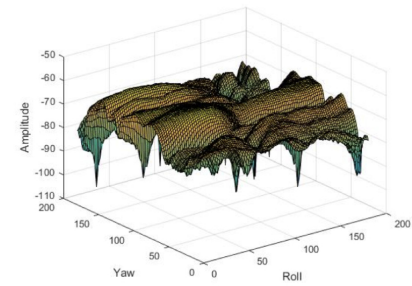


Figure: Anechoic Chamber Antenna Results

PUBLICATIONS

Patent No: 10,784,593

More Information

National Aeronautics and Space Administration
Agency Licensing Concierge
Marshall Space Flight Center
Huntsville, AL 35812
202-358-7432
Agency-Patent-Licensing@mail.nasa.gov
www.nasa.gov

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