



Optics

## Photonic Waveguide Choke Joint with Improved Stop- Bandwidth

Suppresses plane-wave propagation over an ultra-wide stop-band.

NASA Goddard Space Flight Center has developed the Photonic Waveguide Choke Joint with Improved Stop-Bandwidth, a cascaded sub-array photonic choke joint structure for suppressing plane-wave propagation over a wide stop-band. This technology enables two waveguide flanges to be connected without physical contact. This allows the two waveguides to operate at two different temperatures, in thermal isolation. In sensitive instruments, this helps suppress out-of-band leakages from the waveguide to the detector inside the flanges. The invention can be designed to operate at any microwave frequencies, and does not require any peripheral equipment to operate.

### BENEFITS

- Suppresses out-of-band transmission or radiation over an ultra-wide stop-band
- Simple to fabricate using single conductive material
- Requires no physical contact (allows room to house planar circuits to increase waveguide functionality)

technology solution



## THE TECHNOLOGY

The Photonic Waveguide Choke Joint consists of arrays of square metal pillars arranged in a periodic pattern. The unique pattern suppresses plane waves traveling along the structure. This provides broadband plane wave suppression of more than 50 dB above 10 GHz, while allowing DC electrical contact between two plane-wave ports. This topology helps control the flow of light (for instance in a waveguide flange or EMI suppression structure) over a broad waveband.

The arrangement of the metal pillars enables the invention to generate various filter band responses with ultra-wide signal rejection bandwidth. Optional pillars can help increase the transmission isolation between microwave input and output port. As a result, this technology can be designed to reject signal at ultra-wide band rejection, and can be designed to operate at any microwave frequencies.

## APPLICATIONS

The technology has several potential applications:

- Microwave engineering
- Scientific research

## PUBLICATIONS

Patent No: 9310556

National Aeronautics and Space Administration

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