



Breakthrough in Fourier Imaging Systems

NASA scientists have discovered a method for providing Fourier Imaging with as few as one or two grid pairs, while capturing the entire available spectrum.

Result: An imager that costs less to produce and offers high quality imaging.

Technology

Rotational-Translational Fourier Imaging System (MFS-31176)

NASA Field Center

Marshall Space Flight Center (MSFC)

Technology Synopsis

In the past, multiple grid pairs have been needed to create a Fourier telescope. It had been theorized that one or two grid pair telescopes were feasible, but no working prototypes had been developed, until now.

This MSFC invention, the **Rotational-Translational Fourier Imaging System**, has overcome the multiple grid pair hurdle, creating an imaging system that uses only two grid pairs.

- The first grid pair offers multiple real components of the Fourier-based image.
- The second grid pair provides multiple imaginary components of the Fourier-based image.

With the reduction in grid pairs, the major cost of producing the multiple grid pairs has been lowered. In fact, depending upon the application, the two grid pair production costs can be one tenth of the price of a comparable 24-grid pair imager.



Benefits

- **Cost:** A 24-grid pair Fourier Imager could cost as much as 10 times more to produce.
- **Quality:** The 2-pair innovation provides superior imaging over 24- to 48-grid pair imagers.

Commercial Applications

- **Medical Imaging:** Offers finer resolution body scans, finding masses as small as 100 microns.
- **Telescopes:** Allows for imaging of "high energy events" such as solar flares or distant star activity in greater detail than current telescopes.
- **Defect Analysis:** Finds flaws, stress cracks, or other imperfections in metals or assembled metal components that x-rays might miss.

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Breakthrough in Fourier Imaging Systems – *continued*

While one would expect the quality of the invention's spectrum analysis to decline with the reduction in grid pairs, the opposite is actually the case. In fact, the **Rotational-Translational Fourier Imaging System** provides the ability to capture images across the entire available spectrum, rather than at discrete, predetermined intervals within the spectrum.

Although the technology was developed for telescopes, it's strength is full-spectrum imaging of atomic particles and electromagnetic radiation.

Licensing Facts

Protection: NASA has filed a patent application for this technology.

Prototype: Available as a laboratory prototype for basic demonstrations.

Licensing: Licenses are available for all fields of use.

Knowledge Transfer: Inventor is available for assistance to licensee.

About the Inventor

Presently with the NASA Advanced Project Group in the National Space Science Technology Center in Huntsville, Alabama. Has 15 years experience working with Fourier Imaging Systems.

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