The method was tested in computational simulations of random noise superimposed on readings of a dipole magnetic field by four magnetometers in a cluster like the one shown in the figure. The numerical results of the simulations showed that errors in the magnetometer readings were reduced by values ranging from about 20 to about 40 percent.

This work was done by Igor Kulikov and Michail Zak of Caltech for **NASA's Jet Propulsion Laboratory**. *Further information is contained in a TSP (see page 1).NPO-40695*

Compact Instrument for Measuring Profile of a Light Beam

A simple optical assembly is combined with a conventional CCD beam profiler.

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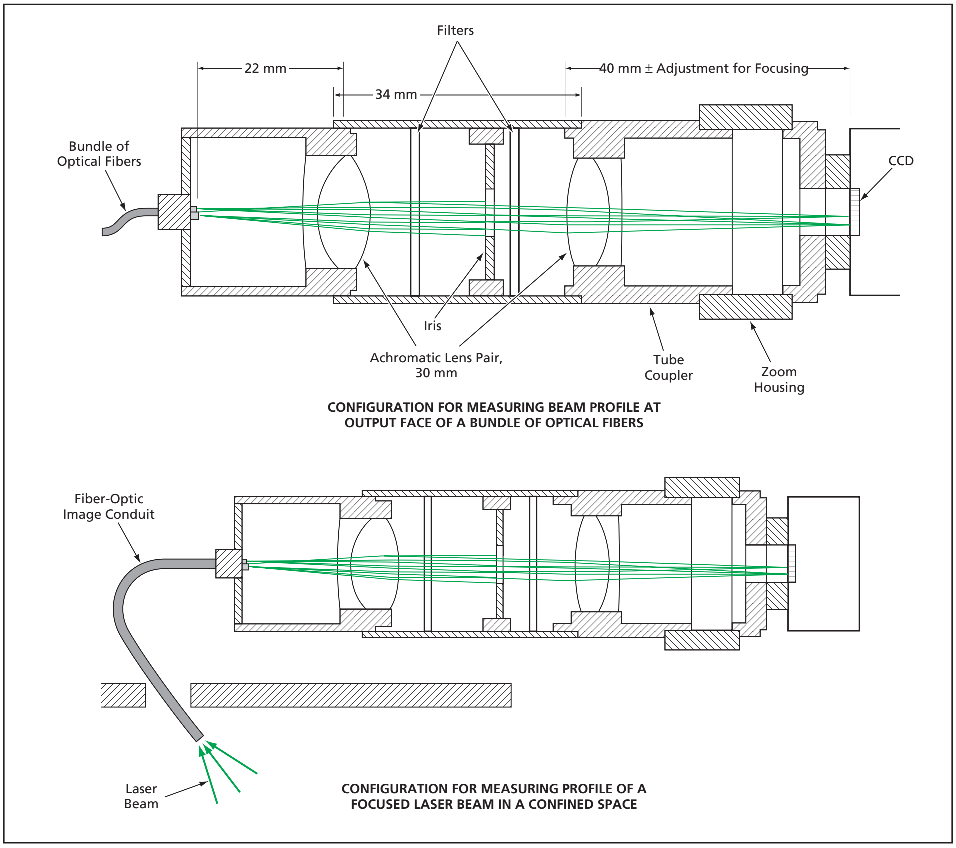
The beamviewer is an optical device designed to be attached to a charge-coupled-device (CCD) image detector for measuring the spatial distribution of intensity of a beam of light (the "beam profile") at a designated plane intersecting the beam. The beamviewer-and-CCD combination is particularly well suited for measuring the radiant-power profile (for a steady beam) or the radiant-energy profile (for a pulsed beam) impinging on the input face or emerging from the output face of a bundle of optical fibers. The beamviewer-and-CCD combination could also be used as a general laboratory instrument for profiling light beams, including beams emerging through small holes and laser beams in free space.

There are numerous commercial beam-profiling instruments, but each is deficient in one or more respects that include, variously, low dynamic range, optomechanical complexity, large size, difficulty of alignment, and/or high cost. In contrast, the beamviewer is compact, easy to align, capable of operation over a wide dynamic range, and relatively inexpensive.



The **Achromatic Lens Pair** projects a magnified image of the cross section of a light beam onto a CCD for measurement of the spatial distribution of light in the cross section.

The beamviewer is designed to be attached to the optical mount on the CCD portion of any off-the-shelf CCD beam profiler. The figure depicts the beamviewer-and-CCD combination as configured for measuring the beam profile at the output face of a bundle of optical fibers. The beamviewer includes an achromatic lens pair arranged in a telecentric system, such that an image of the output face of the fiber-optic bundle is projected onto the CCD with a desired amount of magnification. An iris between the lenses can be used to control the light flux and the depth of focus. There are also spaces between the lenses for inserting neutral-density filters to attenuate powerful light beams to protect the CCD against damage and prevent saturation of its output. By using or refraining from using the iris, the neutral-density filters, and the electronic control of the CCD gain and shutter speed of the off-the-shelf beam profiler, it is possible to attain a dynamic range of 10^{10}.

The beamviewer configuration for measuring the profile of a beam at a plane other than the output face of a fiber-optic bundle is the same as that described above, except for the input coupling. In this case, the output face of a fiber-optic image conduit (a fused fiber-optic bundle with polished end faces that consists of 3-μm fibers, each fiber acts like a pixel) is placed at the input focal plane of the telecentric lens system, and the input plane of the fiber-optic image conduit is placed in the plane where the beam profile is to be measured. The light-intensity distribution at the input face of the conduit is reproduced (with some attenuation) at the output face, then imaged on the CCD as described above.

This work was done by Valeri Papanyan of Lockheed Martin Corp. for **Johnson Space Center**. *For further information, contact the Johnson Commercial Technology Office at (281) 483-3809.*
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