Resin-Transfer-Molding of a Tool Face

Lyndon B. Johnson Space Center, Houston, Texas

A resin-transfer-molding (RTM) process has been devised for fabricating a matrix/graphite-cloth composite panel that serves as tool face for manufacturing other composite panels. Heretofore, RTM has generally been confined to resins with viscosities low enough that they can readily flow through interstices of cloth. The present process makes it possible to use a high-temperature, more-viscous resin required for the tool face. First, a release layer and then a graphite cloth are laid on a foam pattern that has the desired contour. A spring with an inside diameter of 3/8 in. (≈9.5 mm) is placed along the long dimension of the pattern to act as a conduit for the resin. Springs with an inside diameter of 1/4 in. (≈6.4 mm) are run off the larger lengthwise spring for distributing the resin over the tool face. A glass cloth is laid on top to act as breather. The whole layup is vacuum-bagged. Resin is mixed and made to flow under vacuum assistance to infiltrate the layup through the springs. The whole process takes less than a day, and the exposure of personnel to resin vapors is minimized.

This work was done by Mike Fowler of **Johnson Space Center** *and Edward Ehlers, David Brainard, and Charles Kellermann of ROTHE JV. For further information, contact the Johnson Commercial Technology Office at (281) 483-3809.*
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Improved Phase-Mask Fabrication of Fiber Bragg Gratings

Wavelengths and bandwidths can be tailored over wide ranges.

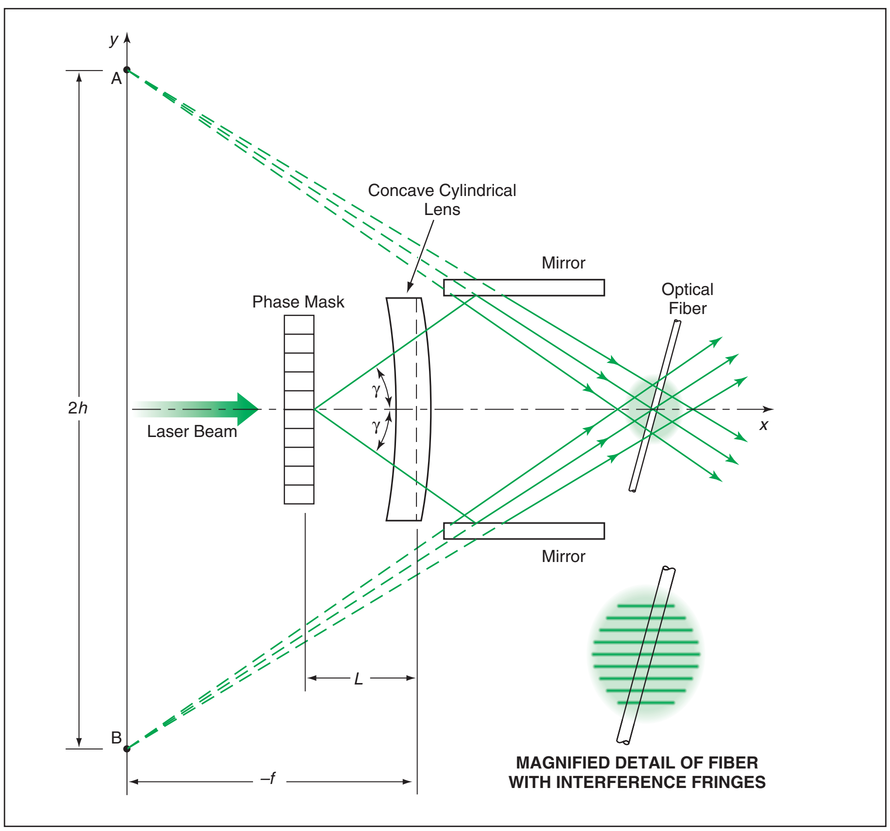
Marshall Space Flight Center, Alabama

An improved method of fabrication of Bragg gratings in optical fibers combines the best features of two prior methods: one that involves the use of a phase mask and one that involves interference between the two coherent laser beams. The improved method affords flexibility for tailoring Bragg wavelengths and bandwidths over wide ranges.

A Bragg grating in an optical fiber is a periodic longitudinal variation in the index of refraction of the fiber core. The spatial period (Bragg wavelength) is chosen to obtain enhanced reflection of light of a given wavelength that would otherwise propagate relatively unimpeded along the core. Optionally, the spatial period of the index modulation can be made to vary gradually along the grating (such a grating is said to be "chirped") in order to obtain enhanced reflection across a wavelength band, the width of which is determined by the difference between the maximum and minimum Bragg wavelengths.

In the present method as in both prior methods, a Bragg grating is formed by exposing an optical fiber to an ultraviolet-light interference field. The Bragg grating coincides with the pattern of exposure of the fiber core to ultraviolet light; in other words, the Bragg grating coincides with the interference fringes. Hence, the problem of tailoring the Bragg wavelength and bandwidth is largely one of tailoring the interference pattern and the placement of the fiber in the interference pattern.

In the prior two-beam interferometric method, a single laser beam is split into two beams, which are subsequently recombined to produce an interference pattern at the location of an optical fiber. In the prior phase-mask method, a phase mask is used to diffract a laser beam mainly into two first orders, the interference between which creates the pattern to which an optical fiber is exposed. The prior two-beam interfero-



An **Optical Fiber Is Exposed** to an interference field generated by an apparatus that affords relative insensitivity to misalignment while making it possible to select the wavelength or range of wavelengths of the Bragg grating to be formed in the fiber.