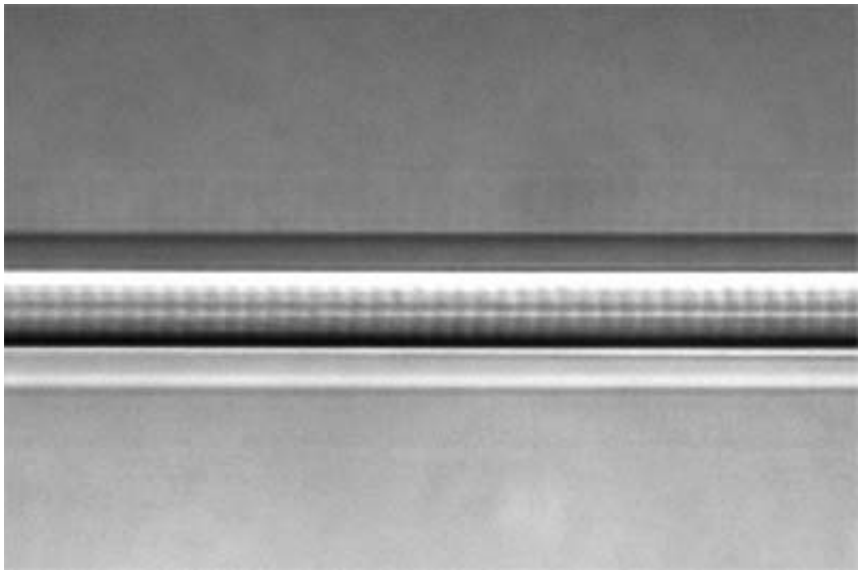
The Institute of OPTICS

Colloquium

University of Rochester

New Light Sources using Fiber Gratings



Paul Westbrook
OFS Laboratories

PhD in Physics, MIT 1998
Bell Labs 1998 - 2001
OFS Laboratories 2001 -

This talk will will describe two new types of light source made possible by the unique dispersion and scattering properties of Bragg fiber gratings.

2:30 pm, Monday, October 15
Sloan Auditorium
Refreshments follow

New light sources using fiber gratings

Paul Westbrook, OFS Labs

Fiber Bragg gratings are well known as light reflectors with tailored spectrum and strength, and have significant application as laser feedback elements and pulse shapers. However, fiber gratings have other unique characteristics that form the basis for new light sources. These include their transmission dispersion and their light scattering capability. This talk will discuss two novel light sources that exploit these effects.

We first present a new type of line source using Bragg gratings whose grating planes are highly tilted with respect to the core axis. Such gratings scatter light out of a fiber core with high efficiency. We have shown that tilted gratings can form a line source along the entire length of an optical fiber. Their high directivity and wavelength specificity make these light sources uniquely suited to numerous applications that employ linescan cameras to examine flows of objects.

Another significant property of fiber Bragg gratings is the dispersion near the photonic band gap. It is well known that such photonic bandgap dispersion can be used to enhance various nonlinear effects such as harmonic generation. We have examined the effect of FBG dispersion on the nonlinear processes in continuum generation using femtosecond pulses. We have found that when a continuum is generated in the presence of the FBG dispersion, large enhancements, some greater that 10dB above the surrounding continuum, are observed. Such enhancements are proving to be of significant use in frequency metrology applications that employ fiber supercontinuum combs. The grating-enhanced E-field has been found to remain coherent with respect to the continuum. Thus, the grating acts as a “spectral magnifying glass” greatly increasing the power of the individual comb lines that are used in precise frequency measurements.

Paul S. Westbrook received a Ph. D. in Physics from MIT 1998, after which he joined Lucent Technologies Bell Laboratories as a post doc and later member of technical staff in the Optical Fiber Research department. He has been Technical Manager of OFS Labs’ Gratings and Devices group since 2001 when Bell Labs optical fiber research (as part of Lucent’s Optical Fiber Solutions (OFS) business) was sold to Furukawa Electric and became OFS Labs. He has worked on several topics in optical physics, including polarization measurement, fiber grating sensors, microstructure fibers, dispersion compensation, continuum generation and photosensitivity.