**11:45 AM**
**WF5 Correction of Polarization Distortions Using Phase Conjugation via Stimulated Brillouin Scattering,** I. D. Carr, D. C. Hanna, *U. Southampton, U.K.* The strongly depolarized beam from a Nd:glass laser amplifier has been accurately conjugated via stimulated Brillouin scattering in a scheme incorporating a two-plate, tapered, polarization-preserving, metallic lightguide.

**WF5 Correction of polarization distortions using phase conjugation via stimulated Brillouin scattering**


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In general, the polarization state of a laser beam is not conjugated by the process of stimulated Brillouin scattering (SBS). There is one state, however, which is correctly conjugated: the case of a uniformly linearly polarized beam. In principle, therefore, one can accurately conjugate a laser beam of arbitrary polarization by converting it into a beam of uniform linear polarization before it enters the SBS cell. Such a technique is potentially important for the phase conjugation of depolarized laser beams and is of particular significance for application to large Nd:glass amplifier chains.

A scheme based on this principle was described by Basov *et al.*[1] in which a depolarized beam was divided into two orthogonal linearly polarized beams, the polarization of one beam was rotated by 90°, and then they were recombined in the SBS cell to form a single uniformly polarized beam.

Here we report the results of an experiment in which the technique was successfully implemented in accurately conjugating the beam depolarized in a Nd:glass laser. We found that provided a number of precautions are taken the scheme can work effectively.

Of crucial importance is the need to achieve good spatial overlap of the two beams throughout the SBS interaction region to obtain phase locking between them, which implies that a guided configuration is necessary. This in turn raises a second important requirement, namely, that the guide should be polarization-preserving. In addition, the need to avoid undesirable effects such as self-focusing has led us to employ methane gas as the SBS medium, which excludes use of total internal reflection as the guiding mechanism.

We satisfied the above requirements by using a two-plate tapered lightguide with aluminum reflecting surfaces. It confines the two beams in the horizontal plane, and a cylindrical lens placed immediately in front of the SBS cell focuses them in the vertical plane.

This guide was found to work effectively, and the results can be summarized by stating that the double-pass depolarization loss for the system remained constant at ~3% even when the pump power to the Nd:glass amplifier was sufficient to give a single-pass depolarization of 20%. At the same time the output beam quality remained close to diffraction-limited. **(12 min)**


1. N. G. Basov *et al.*, JETP Lett. **28,** 197 (1978).