



Properties of an SBS Beam Produced in a Long Fiber by a CW Nd:YAG Laser

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Stimulated Brillouin Scattering (SBS):

- Nonlinear scattering process in which a pump photon is converted into a backward-propagating Stokes (SBS) photon and an acoustic phonon

Properties of SBS Beams Produced in Multimode Optical Fibers:

- Short Fiber: phase conjugate SBS beam (time-reversal wavefront of pump)
- Long Fiber: Gaussian-like SBS beam regardless of pump intensity profile – used for beam cleanup

The Experiment (Phase 1):

- Couple low-power (< 2 W) pump beam into long (~3000 m) fiber
- Create OPD by inserting a microscope slide to bisect the pump and SBS beams
- Investigate properties of SBS beam
 - Lateral Shearing Interferometer (LSI)
 - Determine if LSI fringes show phasing of SBS beam

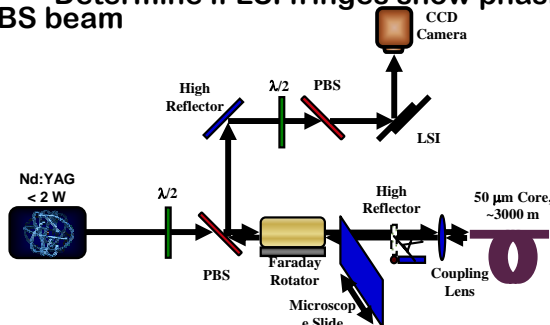


Figure 1: Experimental Setup 1. Microscope slide splits input and SBS beams in half providing OPD. This allows the phasing relationship between two halves of the beam to be investigated with the LSI.



Lateral Shearing Interferometer:

- Two nearly parallel pieces of glass separated by an air gap that allows a lateral shift in reflected wavefronts
- Interference pattern is projected onto screen and analyzed

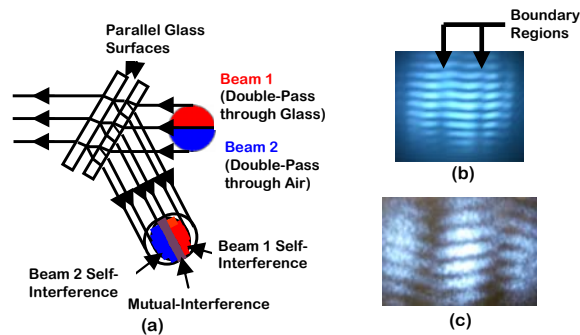


Figure 2: (a) Schematic of the Lateral Shearing Interferometer. (b) Fringes produced in previous experiment by the SBS beam from an optical fiber. Continuity across the boundaries demonstrates phasing of beam halves. (c) Fringes produced in our experiment by retro-reflection from the high reflector. Pattern is not continuous across boundaries, therefore beam halves are not in phase.

The Experiment (Phase 2):

- Split beam and send halves down separate optical paths
- Focus beam halves into separate fibers which are coupled together
- Investigate contribution of each beam toward SBS process
- Determine whether SBS beam propagates evenly back through individual fibers