

Measurement of depolarized guided acoustic-wave Brillouin scattering of Hi1060 fiber

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Fiber can induce modulation to the transmitted light via guided acoustic-wave Brillouin scattering (GAWBS) [1]. This imposes challenge for quantum optical experiments in optical fiber and digital coherent transmission systems [2]. On the other hand, harmonic mode-locking has been demonstrated to take the advantage of GAWBS for stabilization [3]. GAWBS spectrum is decided by the geometrical and mechanical property of optical fiber. In this work, we firstly present our measurement results of depolarized GAWBS spectrum of Hi1060 fiber, which is often used in 1 μm optical systems.

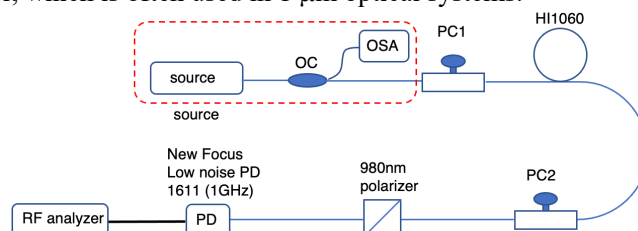


Fig. 1 Setup for measuring Hi1060 fiber GAWBS spectrum. OC: optical coupler, PC: polarization controller, PD: photodetector. The measurement system consisted of 0.65 m of PM 980 fiber and 5 m of Hi1060 fiber.

Figure 1 shows the setup for measuring GAWBS spectrum of Hi1060 fiber. In the measurement, three types of sources were used: linearly polarized ASE, 143 MHz repetition rate mode-locked fiber laser and 170 MHz repetition rate mode-locked fiber laser. Power reached to photodetector (PD, New Focus, low noise PD, model 1611, bandwidth: 1 GHz) was minimized by tuning PC1 and PC2. Electrical signal was analyzed by RF analyzer (R&S, FPC1500, 3 GHz). The measurement setup consists of 0.65 m of PM980 fiber and 5 m of Hi1060 fiber.

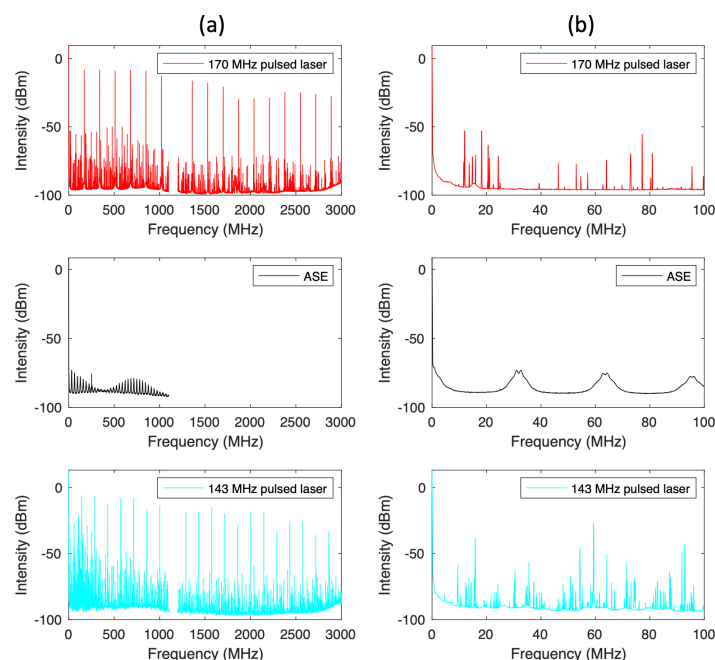


Fig. 2 Measured GAWBS spectrum using different sources. (a) 0~3 GHz span; (b) 0~100 MHz span.

Measurement results were shown in Fig. 2. For ASE measured result, GAWBS peaks had around 3 MHz linewidth. For mode-locked laser measured results, GAWBS peaks had much narrower linewidth less than 100 kHz. By comparing results by 170 MHz and 143 MHz pulsed laser, it was found that they had common peaks and different peaks. GAWBS spectrum extended to over 3 GHz.

References:

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