

# Effect of Brillouin slow light on distributed Brillouin fiber sensors

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The effect of Brillouin slow light on distributed Brillouin fiber sensors (DBFSs) is studied. We demonstrate Brillouin slow light for a 1.2 ns pulse with peak powers ( $P_S$ ) from 3.3 to 56.2 mW on depletion of the pump power ( $P_P$ ) ranging from 1.3 to 83.2 mW in conventional optical fibers (SMF-28). Experiments show that, when pump power depletion is not negligible, for a given  $P_P$  the Brillouin gain and delay time of a pulse decrease when  $P_S$  increases in a long ( $\geq 10$  km) sensing fiber. The optimum pump beam depletion resulting from strong interaction of the pump and the probe in the fiber provides accurate temperature and strain information at a high spatial resolution. Our study reveals that at low  $P_P$  the spatial resolution error caused by the pulse delay for a DBFS with centimeter spatial resolution is less than 5% of the pulse length. © 2006 Optical Society of America

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