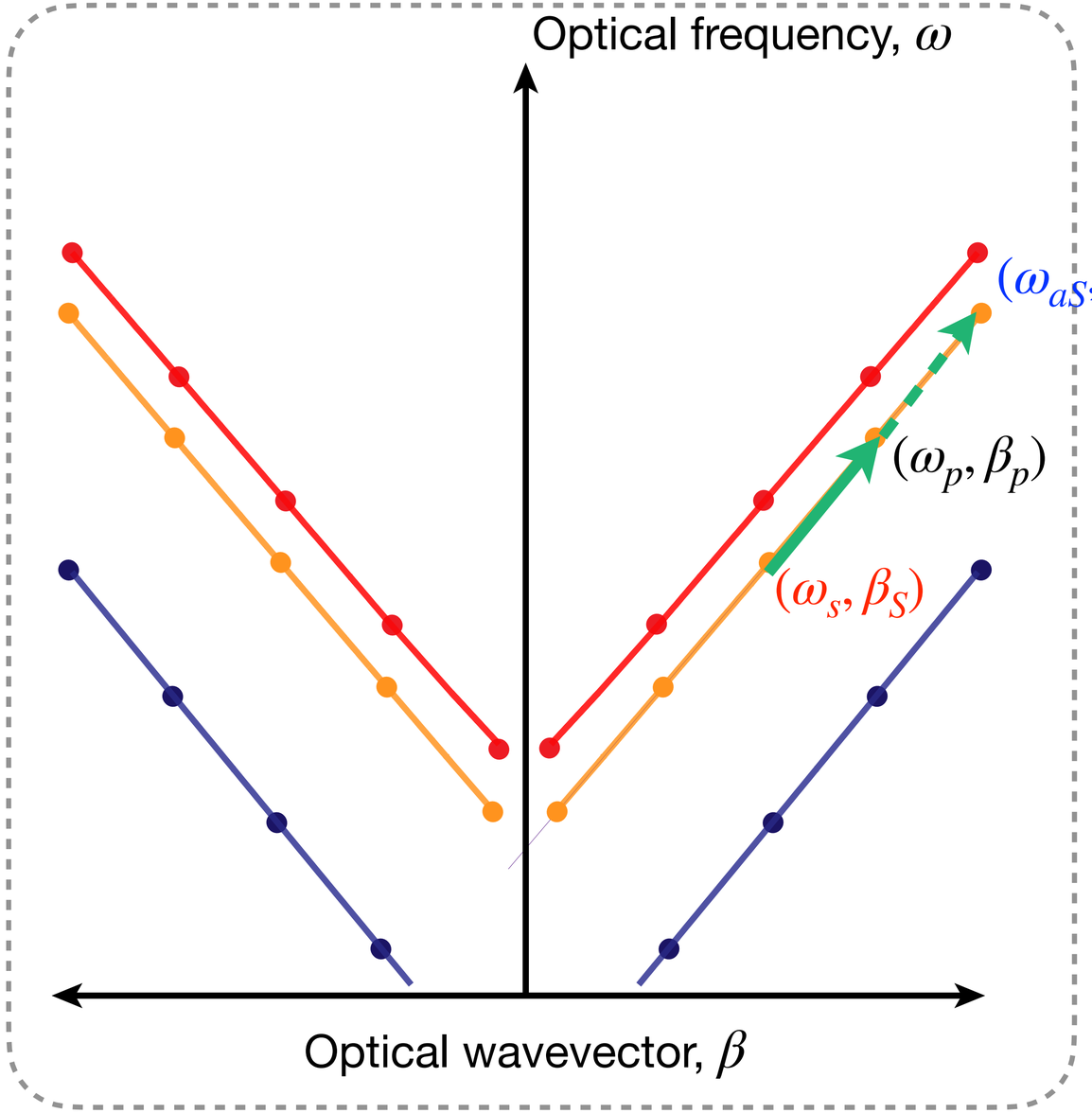
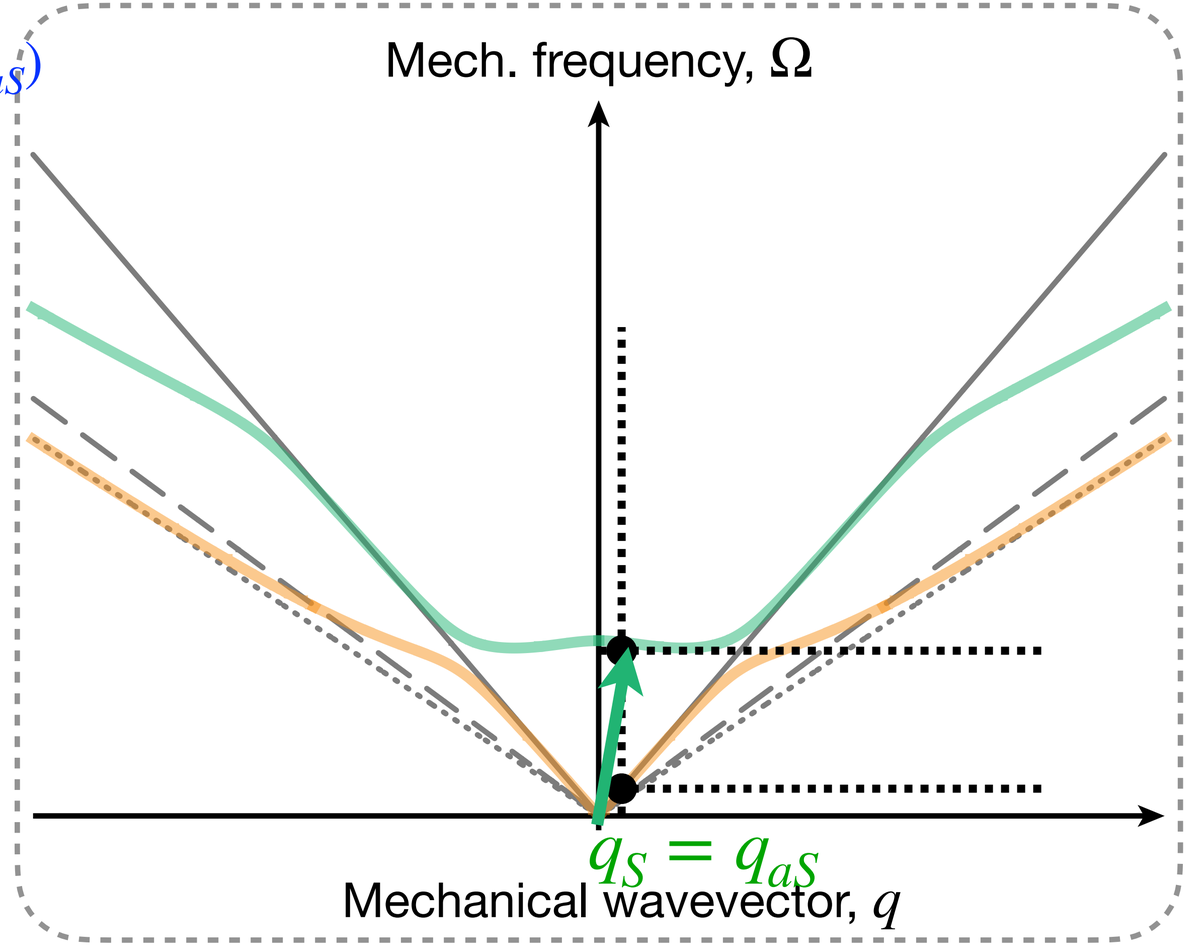
Phase-matching: intra-modal FW



$$q_S = +(|k_p| - |k_S|) \approx 0$$

$$\Omega_S \approx \Omega_0$$



Stimulated Brillouin in optical fibers

Stimulated Brillouin scattering in optical fibers

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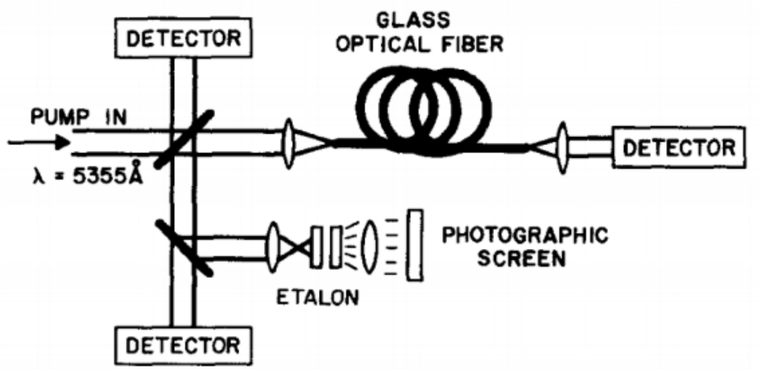
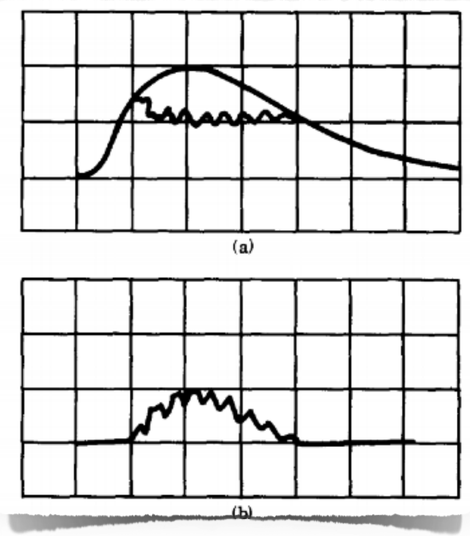
Observations of backward stimulated Brillouin scattering (SBS) in glass optical fibers are reported. Threshold for SBS has been achieved with less than 1 W of input power at 5355 Å. Relaxation behavior in the SBS signal has also been observed and is attributed to finite-cell-length oscillation. Experimental results are compared with theory, and the implied limitation to optical fiber transmission is discussed.



Optical Power Handling Capacity of Low Loss Optical Fibers as Determined by Stimulated Raman and Brillouin Scattering

R. G. Smith

The effect of stimulated Raman and Brillouin scattering on the power handling capacity of optical fibers is considered and found to be important especially when low loss optical fibers are used. A critical power below which stimulated effects may be neglected is defined for forward and backward Raman scattering and for backward Brillouin scattering. This critical power is determined by the effective core area A, the small signal attenuation constant of the fiber α, and the gain coefficient for the stimulated scattering process γ_0, by the approximate relation $P_{crit} \approx 20A\alpha/\gamma_0$. For a fiber with 20-dB/km attenuation and an area of 10^{-7} cm^2 $P_{crit} \approx 35$ mW for stimulated Brillouin scattering. For stimulated Raman scattering P_{crit} is approximately two orders of magnitude higher. It is concluded that these effects must be considered in the design of optical communication systems using low loss fibers.



Smith, R. G. (1972). Applied Optics, 11(11), 2489–2494. (June)
Ippen E P and Stolen R H (1972) Appl. Phys. Lett. 21 539–41 (August)