Matsko *et al.* Reply: In recent papers [1–3] we have theoretically studied stimulated Brillouin scattering (SBS) in an ultradispersive medium, and shown that the properties of SBS change drastically when the group velocity of light in the material approaches or becomes less than the speed of sound. In particular, forward SBS not allowed in a dispersionless bulk medium takes place in the coherent medium. In the preceding Comment by Kovalev [4], it is claimed that our results are incorrect. We disagree.

We consider an interaction of two arbitrary plane monochromatic waves $E_{p1}e^{-i(\nu_1 t-\vec{k}_1\vec{r})}$ and $E_{p2}e^{-i(\nu_2 t-\vec{k}_2\vec{r})}$ with an acoustic wave $A_s e^{-i(\omega_b t+\vec{q}\vec{r})}$. The wave vector of the acoustic wave $\vec{q}$ should satisfy Bragg's condition

$$\vec{k}_2 - \vec{k}_1 = \vec{q}\,. \qquad (1)$$

The vector $\vec{q}$ shows the direction of propagation of the acoustic wave. For example, when E_{p1} is the carrier wave with $\vec{k}_1 = \vec{e}_z|k_1|$ and E_{p2} is the Stokes wave with $\vec{k}_2 = \vec{e}_z|k_2|$ ($|k_1| > |k_2|$), then $\vec{q} = -\vec{e}_z(|k_1| - |k_2|)$, which means that the acoustic wave propagates in the same direction as the carrier wave. To consider either Stokes or anti-Stokes SBS, there is no difference in which form the solution for the sound wave vector is written. Since for the subsequent discussion in our paper [1] the direction of $\vec{q}$ never appears explicitly, our results are correct irrespective of the definition.

The frequency, ω_b, of the acoustic wave that can be excited in the material is, generally, *independent* on the phase-matching condition (1). To have an efficient SBS the frequency of the waves should satisfy

$$\nu_1 - \nu_2 = \omega_b\,. \qquad (2)$$

Thus, conditions (1) and (2) are independent and of a general nature and Eqs. (1) and (2) and Fig. 2 in [1] perfectly match each other, in spite of Kovalev's claim.

We define an ultradispersive medium as a medium with linear dispersion

$$|\vec{k}_1| - |\vec{k}_2| = (\nu_1 - \nu_2)/V_g\,, \qquad (3)$$

where V_g is the group velocity of light. The expression (3) is valid in some finite bandwidth of frequencies $\nu_0 + \delta\nu \geq \nu_{1,2} \geq \nu_0 - \delta\nu$, $\nu_0 \gg \delta\nu$, that depends on the material (atomic vapor, doped solid, photonic band gap structure, etc.). The dispersion relation for the sound wave is chosen as $\omega_b = qV_s$. More general dispersion relations are analyzed in [3].

The steep dispersion of the medium drastically changes the properties of SBS. For example, for backward SBS ($|k_1| > |k_2|$), the phase-matching condition is $\omega_b/V_s = |\vec{q}| = 2|\vec{k}_2| + (\nu_1 - \nu_2)/V_g$. If $V_s = V_g$ and $\nu_1 - \nu_2 = \omega_b$ this condition is never fulfilled *unless* $|\vec{k}_2| = 0$. Because $|\vec{k}_2|$ *cannot go to zero,* as mentioned in [1], the scattering is *forbidden* by the phase-matching condition. Strictly speaking, Kovalev supports our statement regarding backward SBS.

Interesting phenomena may occur if the bandwidth of the steep dispersion is less than the bandwidth of usual backward SBS in a dispersionless medium. Then, one will be able to see backward SBS for all allowed frequencies, except the frequency region of steep dispersion (cf. dark resonances in quantum optics).

For the forward scattering, in turn, the phase-matching condition $\omega_b/V_s = |\vec{q}| = |\vec{k}_1| - |\vec{k}_2| = (\nu_1 - \nu_2)/V_g$ is always satisfied if $V_s = V_g$, $\nu_1 - \nu_2 = \omega_b$, and $2\delta\nu > \omega_b$, i.e., scattering occurs for any resonant acoustic frequency that is in the linear dispersion band of the medium. The exponential growth for the acoustic and Stokes waves occurs in the whole region where we have the phase-matching condition fulfilled, in spite of Kovalev's statement. This broad band scattering [1] is similar to SBS in plasmas, where a similar situation occurs for the spatial modes of plasma waves [5]. On the other hand, the resonant frequency for the acoustic wave should be fixed by external conditions, for example, by boundary conditions as in [2,3], to have exponential *narrow band* growth of the waves.

In conclusion, we believe that our results are correct and that electromagnetically induced transparency leads to a truly anomalous regime of stimulated Brillouin scattering.

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