**Ferrell and Bhattacharjee Respond:** We recently noted[1] the necessity of including the bulk viscosity in second-sound damping. This contribution is $B_\psi' = (\rho_s/\rho_n)D_1$, where $D_1$ is the *background component* of the first-sound damping. The latter is taken to be proportional to $\rho_n/\rho$. $\rho_{s,n}$ and $\rho$ are the superfluid, normal fluid, and total fluid density, respectively. Ahlers and Hohenberg[2] "agree that the correction discussed by FB should appear below $T_\lambda$" but assert that "its size has been severely overestimated." They base this assertion on an incorrect interpretation of the experimental first-sound data of Chase,[3] exhibited in Fig. 1. The solid curve shows the theoretically expected first-sound damping, separated into its critical[4] and background components. At the λ point the background, shown by the dashed curve, is equal to $2.0\times10^{-17}$ sec$^2$/cm. This corresponds to the value $D_1 = 5.0\times10^{-4}$ cm$^2$/sec that we used in Ref. 1.

It is true that the experimental value for the total $D_1$ does vary by a factor of 2.4 in the reduced-temperature interval $0.01 \leq |t| \leq 0.03$, in satisfactory accord with the theoretical curve. But the rise in the total $D_1$ as $|t|$ decreases from $|t| = 0.03$ is almost entirely due to the onset of the critical first-sound damping. Ahlers and Hohenberg[2] mistakenly include the critical component of $D_1$ and therefore should find a $B_\psi'$ bigger than we found, and *not smaller*, as they assert. The critical part of $D_1$ comes from the relaxation of the longitudinal component of the order parameter.[4] Its connection with $D_2$ is rather more complicated than Ahlers and Hohenberg[2] seem to appreciate, because of the opposing transport of superfluid and normal fluid, as noted by Khalatnikov.[5] The relaxational contributional contribution to $D_2$ cancels completely in the background region and sets in only weakly as the λ point is approached.[6]

Ahlers and Hohenberg[2] want to drop $B_\psi$ from the damping. But $B_\psi$ and $B_\psi'$ are distinctly separate contributions and occur differently in the equations of motion. Dropping $B_\psi$ would furthermore be inconsistent with the excellent agreement with experiment that we found for our theory[7] of the λ-point first-sound attenuation using $B_\psi = 1.0\times10^{-4}$ cm$^2$/sec. Being a massless Goldstone mode, the transverse component of the order parameter can be expected to be temperature independent below the λ point. We further note that their neglect of $\rho^2\zeta_3 - 2\rho\zeta_1$, *which we do not neglect*, is unjustified and leads to erroneous conclusions.

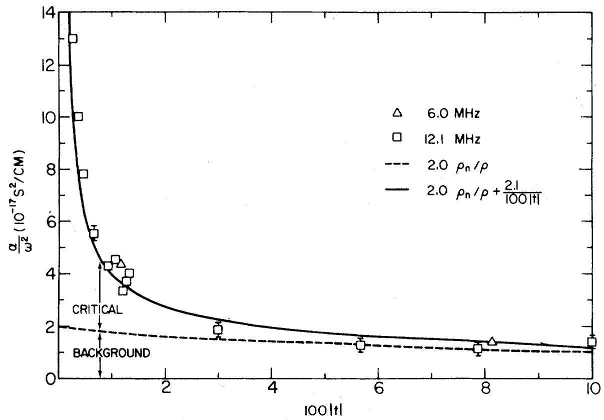


FIG. 1. Measurements by Chase (Ref. 3) of $\alpha/\omega^2$ vs reduced temperature for two different frequencies $\omega/2\pi$. $\alpha$ is the amplitude attenuation coefficient in nepers per centimeter. The theoretically expected $\alpha/\omega^2$ (solid curve) is decomposed into its background component (dashed curve) and critical component (Ref. 4).

In conclusion, we believe that our calculation of the normal-fluid bulk-viscosity contribution to second-sound damping should stand as presented.[1]

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