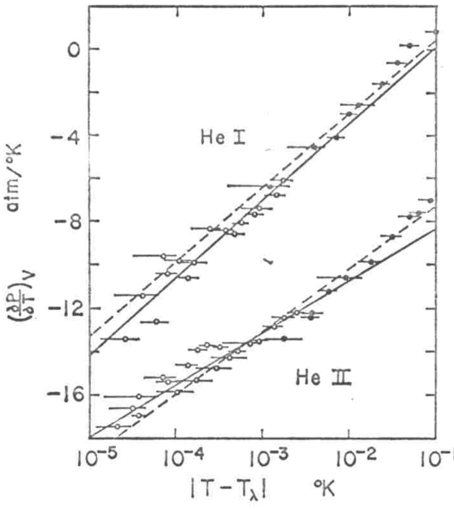

FIG. 10. Comparison of the calculated $(\partial P/\partial T)_V$ at 13 atm with that measured by Lounasmaa. Solid lines: Logarithmic fit by Lounasmaa. Open circles: experimental points of Lounasmaa (Ref. 25). Closed circles: experimental points of Lounasmaa and Kaunisto (Ref. 23). Dashed lines: $(\partial P/\partial T)_V$ as calculated from our data by interpolation.

no other results on the expansion coefficient, we are able to compare our work with data on the pressure coefficient and the isothermal compressibility. It should be noted that such calculations are limited only by the accuracy of our results and the uncertainty of interpolation, and do not depend in any way on thermodynamic approximations. Turning first to the isochores, we note that although the pressure coefficient $(\partial P/\partial T)_V$ must remain finite, our calculations of the isochores yield results that can be represented by a logarithmic expression over the interval of $|T-T_\lambda|$ from 10^{-2} to 10^{-5}°K. Thus it is convenient to express the results of our calculations in terms of the same parameters as have been used for α_P and C_P. These are shown in Fig. 9, along with the previous experimental results of various authors. The early results of Lounasmaa and Kaunisto[23] had a limiting resolution of only 10^{-3}°K; thus, as has been pointed out by Lounasmaa, they did not succeed in obtaining the limiting form of the singularity, and therefore the disagreement with our values, which is pronounced in the He II region, is not significant. We consider that the agreement with Kierstead[24] is generally gratifying but that his results indicate that A_I''' is increasing more rapidly at high pressures than our calculations indicate. His data are apparently very good and extend down to a resolution of 2×10^{-6}°K. The agreement with Lounasmaa's parameters[25] at 13.0 atm is not so good, and in order to assess the difference we have plotted our calculated values directly on Lounasmaa's data in Fig. 10. While our results are not the best fit to his data, they do fall within most of the error bars that he gives, and therefore we conclude that the agreement is reasonable. There are no experimental results below 8 atm so that our calculated results must stand in this area.

Similar calculations along various isotherms yield values for the compressibility, and these values are given in Fig. 11 in terms of the parameters of a logarithmic singularity. The range over which our calculations are valid is from roughly 10^{-3} to 1 atm on each side of the transition. It will be noted that there is considerable scatter in the calculated points. This is presumably due to difficulties in the calculation which arise because the singularity appears as a small change in a large quantity. The same difficulties arise in the experimental work. Kierstead[24] has obtained very good resolution of the transition in his work near the melting curve. We have plotted the equations he presents for k_T and find that the results thus obtained are increasing more rapidly than a logarithmic singularity. Grilly[18] has obtained results of moderate resolution at a number of temperatures and while he does not present these directly in the form we are using, we have been able to estimate the values of the parameters that fit his data. These values are also shown in Fig. 11, and considering both the scatter of the points and the fact that the

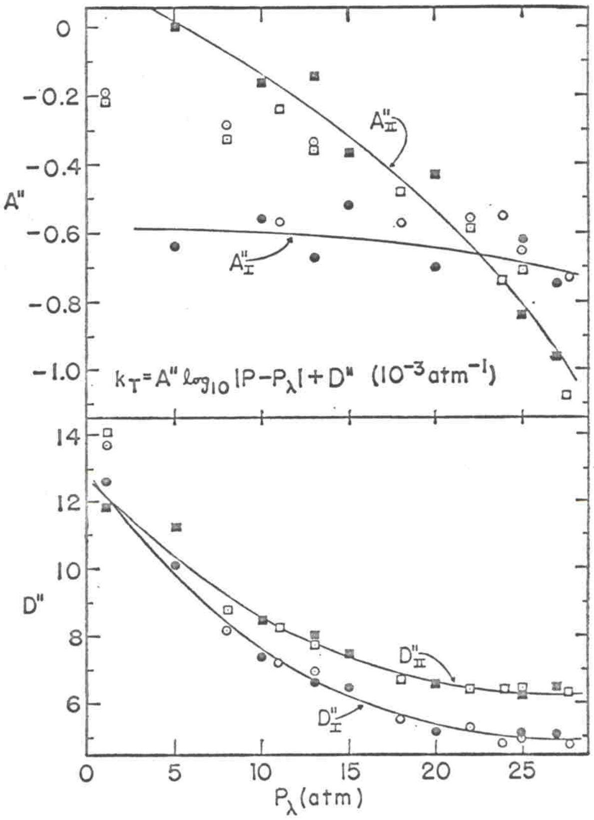

FIG. 11. The parameters A'' and D'' (in atm^{-1}) for the logarithmic fit to k_T. Circles are for $T>T_\lambda$; squares are for $T<T_\lambda$. Black circles and squares: present direct calculations from experiment; circles and squares with dot: cylindrical approximation calculations; open circles and squares: Grilly (Ref. 18).

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