TABLE III. Elastic compliance constants at room temperature.

	S_{11}	$-S_{12}$	$-S_{13}$	$-S_{14}$	S_{33}	S_{44}	S_{66}	Source
Sb	16.2	6.1	5.9	12.2	29.5	38.6	44.6	This work, least squares
	17.7	3.8	8.5	8.0	33.8	41	43	Bridgman[a]
Bi	25.74	8.01	11.35	21.50	40.77	115.90	67.51	ELR,[b] least-squares recalculation
	26.9	14.0	6.2	−16.0	28.7	104.8	81.2	Bridgman[a]

Units: 10^{-13} cm²/dyn.

[a] See Ref. 2. [b] See Ref. 1.

TABLE IV. Calculated and experimental limits of velocities.

	Sb			Bi			
	Lower exp limit	Least-squares calculation	Upper exp limit	Lower exp limit	Least-squares calculation	ELR calculation	Upper exp limit
v_1	3.84	3.85(2)	4.00	2.518	2.540	2.545	2.562
v_2	2.95	2.96(0)	3.04	1.541	1.552	***1.635***	1.559
v_3	1.49	1.50(1)	1.57	0.851	0.851	***0.667***	0.859
v_4	3.91	3.98(5)	4.05	2.553	2.559	2.565	2.589
v_5	2.20	2.26(0)	2.27	1.398	1.407	1.406	1.416
v_6	2.19	2.20(4)	2.28	1.016	1.026	1.026	1.028
v_7	2.57	2.58(0)	2.63	1.957	1.971	1.571	1.987
v_8	2.42	2.43(0)	2.47	1.063	1.073	1.073	1.085
v_9	3.06	3.17(0)	3.18	2.063	2.067	2.109	2.101
v_{10}	2.75	2.95(6)	2.98	1.505	1.517	1.518	1.539
v_{11}	1.24	***1.86(6)***	1.26	1.144	1.147	***1.071***	1.156
v_{12}	4.06	4.17(5)	4.21	2.400	2.437	***2.491***	2.482
v_{13}	1.38	1.50(9)	1.69	0.907	0.912	0.910	0.913
v_{14}	1.41	1.56(2)	1.59	1.049	1.508	***0.937***	1.061

Units: 10^5 cm/sec.

was relaxed to obtaining a near-least-squares minimum fit. We estimate our values, presented in Table II, to be within about ±2% of a true least-squares minimum fit and we note that such a fit would be as uneven as the fit presented.

When applied to ELR's bismuth data, our procedure yields essentially one set of constants except for c_{13} which may range within ±0.09 of the value given without causing any one velocity to be calculated outside its experimental limit. That one set of values obtains is readily evident from the facts that our values differ little from ELR's, yet five of their calculated velocities are outside the experimental range and just one of ours is at the lower experimental limit. This fit is characterizable as even and quite good, considering the very small velocity tolerances ELR specify.

B. Comparison of Constants and Direct Calculation of c_{13}

Included in Table II with our constants are c_{11} and c_{33} calculated from Eckstein's[10] 77°K velocity data for antimony, ELR's bismuth constants values, bismuth and antimony values calculated from Bridgman's[2] early isothermal compliance measurements, unpublished antimony values of Leventhal[13] and some calculated bismuth values of Kor.[14] Agreement with Eckstein's c_{11} and c_{33} for antimony has already been pointed out in Sec. IV (by noting that his v_1 and v_7 and ours are the same); and except for c_{11}, agreement with Leventhal is fair. Although the nature of our original stock and our method of preparation are preferable to Leventhal's, we cannot account for the discrepancies on the basis that our crystals are purer and less strained. We have already noted that v_7 and v_8 were also obtained on cleaved surfaces and that these values agreed well with the values obtained on our cube. The purity of the cleaved specimen was less than that of the cube (although very likely still purer than Leventhal's). Furthermore, v_9 and v_{11} were again measured after the specimen was (accidentally) damaged. A 3-mm transducer was placed next to the cracked region where no visible signs of damage were obvious; no change in the velocity values were found.

Our recalculation of the bismuth constants yields essentially ELR's values within about 1% or less. Compared to Bridgman's results, our individual constants fit poorly for both antimony and bismuth, even allowing for the large cumulative error introduced for some of the constants by the inverse tensor transformation and the negligibly small isothermal corrections. Uniform and over-all agreement is not necessarily to be expected since some of his individual values are adjusted to fit his linear and volume compressibilities. On the other hand, the compressibilities calculated from our data do agree with his directly measured unadjusted compressi-

[13] E. Leventhal, MS thesis, Polytechnic Institute of Brooklyn, New York, 1959 (unpublished).
[14] S. K. Kor, Physica 28, 837 (1963).