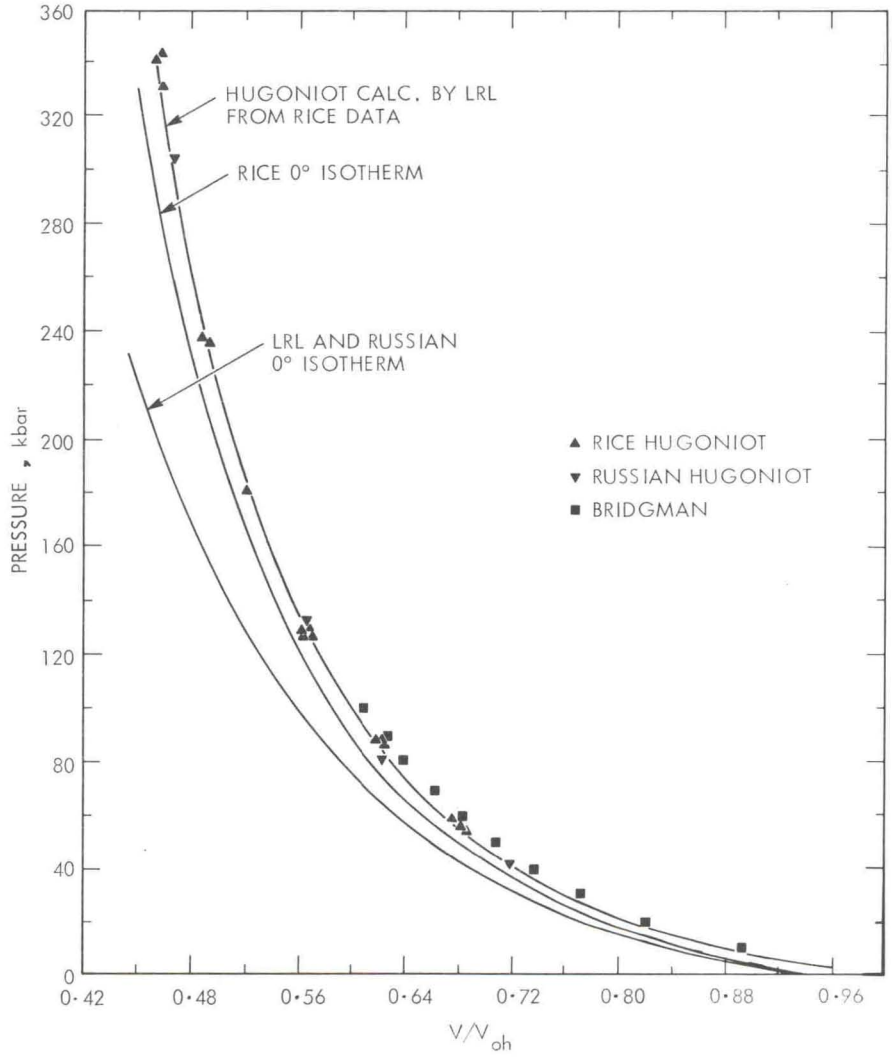

Fig. 2. Comparison of Bridgman isothermal compression data with shock data and calculated isotherms for sodium.

on the assumed equation of state, as is illustrated in Figs. 1–4, by the large differences between the zero degree isotherm calculated with different theories by the Russian experimenters and by Rice from very similar data. As we shall later argue in some detail, Rice's estimates of the 0° or 298°K isotherms for the alkali metals, although in considerably better agreement with Bridgman data, do not appear to have any reasonable basis in theory and are likely to be incorrect. Using Rice's data, we also calculate by a somewhat different theory an isotherm which is indistinguishable from the Russian curves (except for Li). The disagreement between the Russian and Bridgman isotherms is extremely large, averaging to ~30 kbar at a pressure of 100 kbar. Specifically, the pressure differences systematically increase with compression for each element and increase

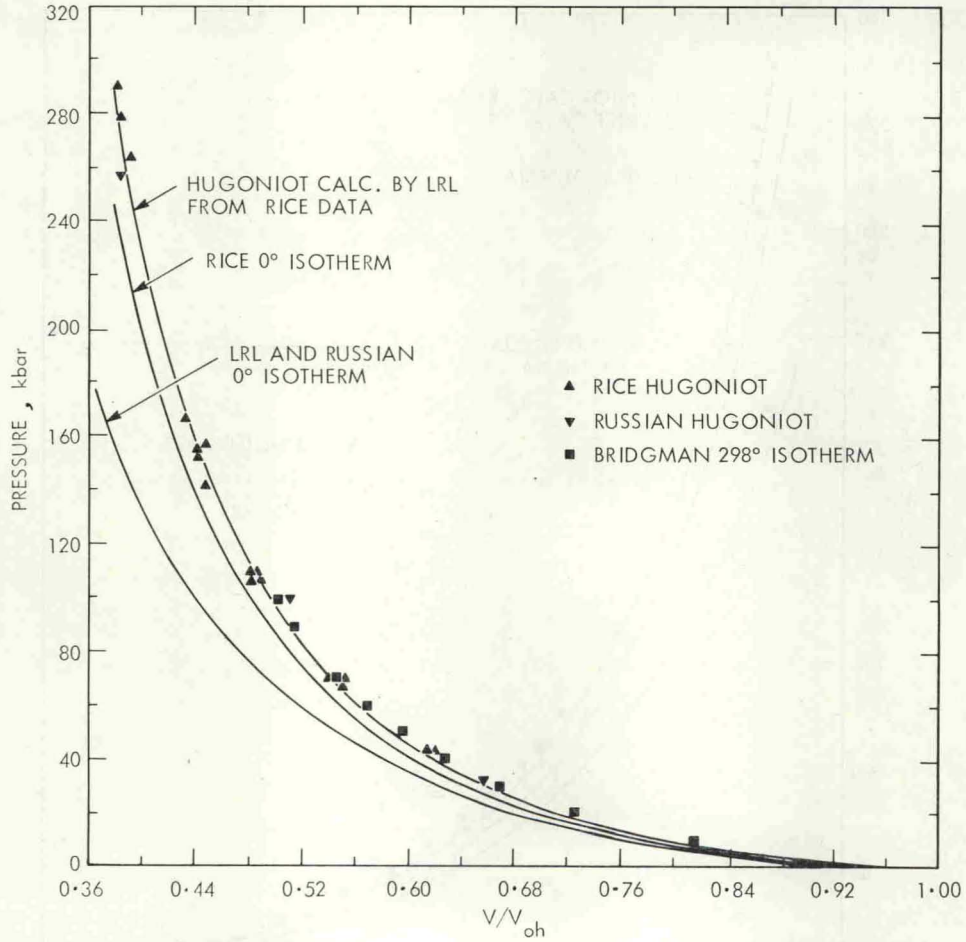

Fig. 3. Comparison of Bridgman isothermal compression data with shock data and calculated isotherms for potassium.

with the initial compressibility of the metal. Such discrepancies are outside the range of quoted experimental error and unusually large in view of the general agreement found for the less compressible elements[1].

BRIDGMAN DATA ON ALKALI METALS

It is important at this point to briefly review the consistency of Bridgman's measurements of the compressibility of the alkali metals. Bridgman[9(a)] first reported data on the compressibility of the alkali metals in 1922. The maximum reported pressure in these experiments was 12 kbar. In 1935, Bridgman [9(b)] extended his maximum pressure to 20 kbar in Li, Na, and K. In these experiments, he measured the difference between the compressibility of alkali metals and the compressibility of iron. Shortening of a test specimen was observed by motion of a lever along a slide wire potentiometer inside his press. The pressure was determined by reading from a manganin cell pressure gauge. Lever arms were used to magnify the apparent motion of the sample as it shortened in length.

The measurements reported in 1935 differed sharply from the earlier 1922 measurements