We cannot immediately compare our results with those of Animalu *et al.* (1966) since they set $A_2 = Z/R_M = 1{\cdot}50$ in their local HA potential. This change in A_2 decreases the magnitude of oscillations in the potential for large q and, as they remarked, does not affect greatly the values of the potential at the reciprocal lattice vectors. It does, however, change the phonon frequencies markedly, particularly in the 100T branch. As this change is almost ten times larger than that caused by the HA damping factor, we feel that our approach gives a better estimate of the reliability of the original HA method.

The only other calculation with which we can compare our elastic constants is that of Shyu and Gaspari (1969) who used a local Ashcroft potential, screened via Hubbard's $f(q)$, to obtain $C_{11} = 0{\cdot}78$ for Al. Our most reasonable value, as predicted by the local HA potential, was 1·02, while Shaw's potential gave 1·06. Even allowing for its overestimation of the rest of the [100L] branch, Shaw's result is better than the others, so we can hope to improve the pressure derivatives also by using his potential.

3.2. *Sodium*

The corresponding Shaw and HA dispersion curves for Na, together with the experimental values, at 80°K, of Woods *et al.* (1962), are shown in figure 2. Again the overall agreement of Shaw with experiment is good, and better than HA.

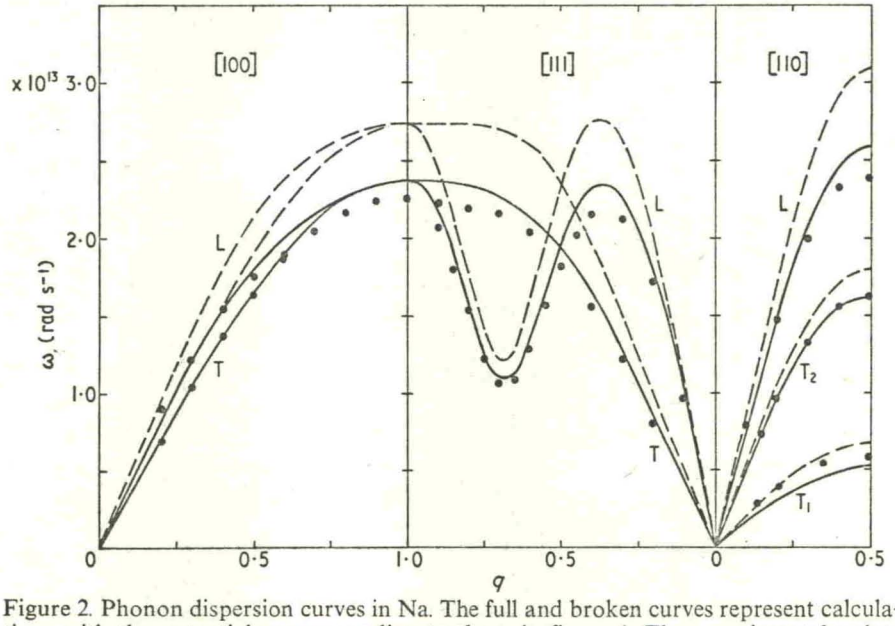

Figure 2. Phonon dispersion curves in Na. The full and broken curves represent calculations with the potentials corresponding to those in figure 1. The experimental points are taken from Woods *et al.* (1962). Units for the wave vector are also as in figure 1.

In Na, ω_c^2 and ω_E^2 do not cancel to the same degree as in Al, so the effects of any variations in the potential are not as pronounced. With both the Shaw and HA bare potentials, neglect of the exchange-correlation corrections in the dielectric function increases the L phonon frequency at the [110] zone boundary by 10% and the L elastic constants by 50%, but leaves the rest of the dispersion curves virtually unaltered (see tables 4 and 5). The different values of β yield results lying between these, with very little dependence on the actual form of $f(q)$. Therefore it is again necessary that these effects be included, while our results suggest that β_{AS} may again be preferable to β_H.

As in Al, Animalu's semi-non-local potential (1966) agrees closely with HA local. Comparing lines 1 and 2 in the tables 4 and 5, we see that Shaw's potential represents a distinct improvement, relative to experiment, over the local Ha potential. The elastic constants for