plotted versus the ratio of maximum to initial density for a family of shocks having maximum density ratios up to 1·16. The solid curve represents temperatures calculated from (26) while the two dotted curves are obtained from (19) and (27). Figure 2 is similar but shows the temperature versus density relations within two particular shocks, viz. the ones for which ρ_m/ρ_0 equals 1·15 (lower curves) and 1·10 (upper curves). It is clear that the plastic work makes a substantial contribution to the temperature increase in strong shocks. Therefore, we assert that it is quite important to properly account for the local entropy production since the temperature cannot be accurately estimated on the basis of thermoelastic theory alone.

Figure 3 shows the variation of non-dimensionalized maximum pressure, p_m/K^*, with the density ratio. Compared on the basis of equal density changes the difference in pressures between the thermal and non-thermal cases is quite small. Even the

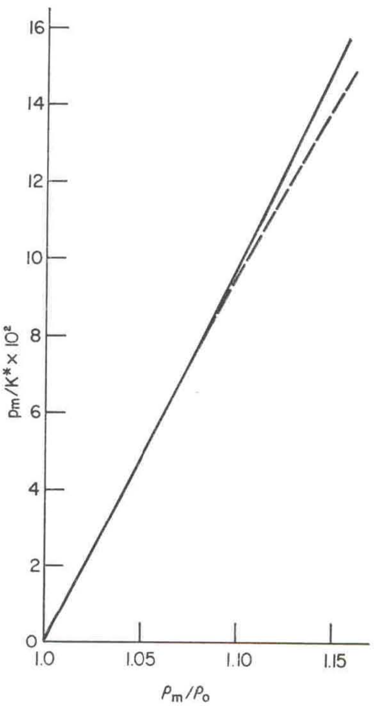

FIG. 3. Non-dimensionalized plot of maximum pressure versus maximum density. Material characteristics are $G = 3K/8$, $\mu = 5$, $\beta T_0 = 10^{-2}$ and $\rho_h = \rho_0$ for the solid curve while the dashed curve is obtained by disregarding temperature effects which corresponds to taking $\beta = 0$.

small difference that does occur could be diminished by non-dimensionalizing with respect to the local compressibility $\varkappa \approx K(1+\mu\beta T)$ rather than the initial compressibility $K(1+\mu\beta T_0)$.

Shown in Fig. 4 is the variation of non-dimensionalized plastic wave speed $\rho_0 V_0^2/K^*$ with the ratio of maximum to initial density for both thermal and non-thermal cases. It is obvious that a faster wave is required in the thermal case to achieve a given compression because of the thermal energy losses from the wave which are neglected in the non-thermal analysis.

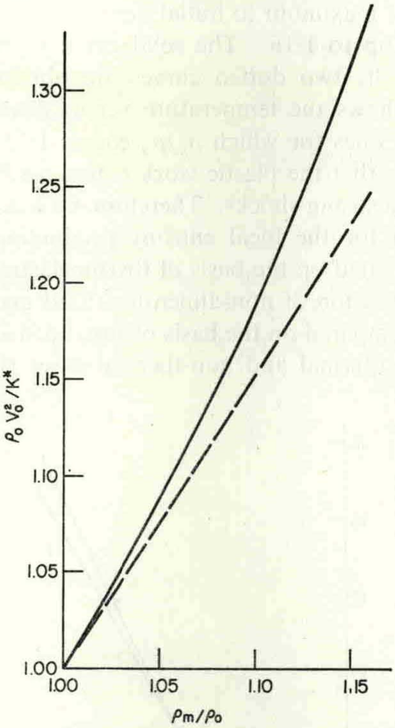

FIG. 4. Non-dimensionalized plastic wave speed versus the ratio of maximum to initial density. Material characteristics are the same as in Fig. 3 and again the solid curve includes the effects of temperature while the dashed curve shows the corresponding results obtained disregarding temperature effects.

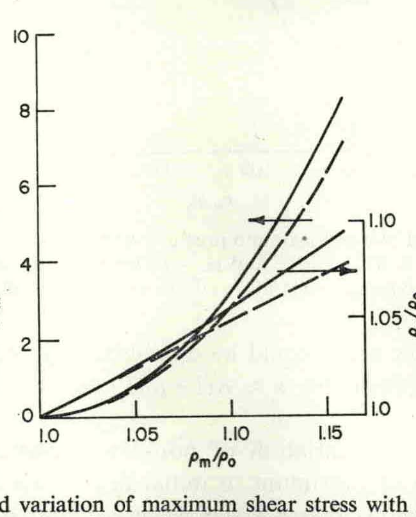

FIG. 5. Non-dimensionalized variation of maximum shear stress with maximum density. Shown also are the values of density at which the maximum shear stress occurs. The solid curves correspond to a material for which $G = 3K/8$, $\mu = 5$, $\beta T_0 = 10^{-2}$ and $\rho_h/\rho_0 = 0$ while the dashed curves are for the non-thermal case, $\beta = 0$.