More experimental data are needed in the transition region to accurately map the shape of the Hugoniot curve.

The occurrence of a normal instantaneous transition in a material is reflected in a U_s-U_p plot as a region of constant shock velocity and in this circumstance a two-wave structure is quite likely to be observed.[28, 37] For benzene, the situation is more involved because the U_s-U_p plot reveals a region of slowly increasing shock velocity with particle velocity. A two-wave structure in this situation may still be expected. Duvall[38] treats the case of a P-V Hugoniot described by a concave upward curve connecting at higher pressures to a convex upward curve. This is similar to the benzene case and Duvall predicts this condition will produce a shock wave characteristic of the transition followed by a compression wave. Several experiments were conducted to detect a two-wave structure but the results were inconclusive because of inadequate experimental design. A hydrodynamic calculation in which the experimental arrangement was simulated, indicated that the initial shock wave transmitted into the benzene was overtaken by reflected shock wave from the target plate before the measurement was complete. The calculation was made from a hydrodynamic computer code prepared by Wildon Fickett.

Another explanation of the observed behavior is based on the existence of a metastable Hugoniot and a pressure dependent transition.[37] The original phase is postulated to exist in a metastable condition in the upper phase region and in addition, the larger the overdriving pressure, the farther up the overdriven Hugoniot curve the material goes. Some time later the compressed benzene transforms, allowing the input pressure to relax to the second phase. The