numerical integration arises because the shock profile has not reached its steady state or permanent regime. For the permanent regime, to which jump conditions apply, the locus of p+q vs v lies along two straight lines, OM and MC in Fig. 5.14. M represents the break in pressure between the first wave and the second, and the velocities of the first and second waves are proportional to the square roots of the slopes of these two lines. When the pressure is applied suddenly and the relaxation time is long, the state of an element will rise to a point on the extended metastable curve of phase 1, say C' in Fig. 5.14, and then proceed toward the equilibrium point C along an isobar. During the process of precursor decay, the locus will lie along intermediate curves such as OabC. In fact then the leading wave and the developing profile behind it propagate at first with a velocity proportional to the square root of the slope of the chord OC', only gradually approaching the smaller steady state velocities. Consequently the wave front position calculated by integration of the flow equations should always lie ahead of the position predicted by the jump conditions whenever the constitutive relations include rate or time dependent processes. Loci for p+q obtained in the calculations for several positions and two values of C_L are shown in Fig. 5.15. They do indeed display the behavior described in Fig. 5.14; moreover the locus is relatively independent of C_L.

It is possible to calculate the equilibrium Hugoniot curve for a material undergoing a phase change using only the jump conditions and an equation of state (17). However, once a

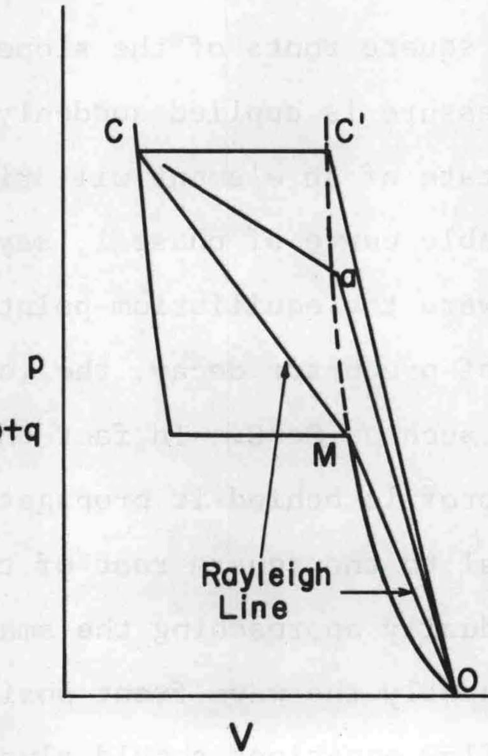

Fig. 5.14. --Pressure Profile and Total Stress with Respect to the Rayleigh Line.