From the definition of  $\alpha^{eq}$  we have

$$\alpha^{\text{eq}} = 0, \quad p \le p_0$$

$$= (v-v_0)/(v_a-v_0), \quad p_0 \le p \le p_a \quad (5.23)$$

$$= 1, \quad p_a \le p$$

where  $p_0$ ,  $p_a$ ,  $v_a$ ,  $v_o$  are defined in Fig. 5.18. Combining Eq. (5.23) with (5.18), (5.21), and (5.22) yields the following expressions for dp/dx:

$$dp/dx = m^{3}(v_{o}-v_{1})/\tau(1+m^{2}dv_{1}/dp)(m^{2}v_{o}-p+p_{o}),$$

$$p_{o} \le p \le p_{a}$$
(5.24)

$$dp/dx = m(m^{2}(2v_{o}-v_{1}-v_{a}) + p_{o}-p)/\tau(1+m^{2}dv_{1}/dp) \cdot (m^{2}v_{o}-p+p_{o}) , p_{a} \le p \le p_{f}$$
 (5.25)

Here  $v_1$  is a known function of p, Eq. (5.20). Examination of Eqs. (5.24) and (5.25) shows that dp/dx = 0 at  $p = p_0$  and  $p = p_1$ . In Eq. (5.22), m < 0 for a forward-facing shock,  $\alpha^{eq} - \alpha > 0$ ,  $v_1 - v_2 > 0$ , and  $1 + m^2 dv_1/dp > 0$ , from Fig. 5.18. Therefore dp/dx < 0 throughout the transition. The qualitative features of dp/dx are shown in Fig. 5.18.

Eqs. (5.24) and (5.25) have been integrated for the iron transition, assuming that no temperature changes occur in the shock. The results are compared with the temperature-independent transient case in Fig. 5.19 for a driving pressure of .200 Mbar. The shock width, defined as  $\Delta x = \Delta p / |1 dp/dx|_{max}$ , is for this case about .3 cm. The steady velocity of the second shock with respect to the material ahead of it is  $U_{II} = 0.37$  cm/ $\mu$ sec. The relaxation time assumed for the calculation

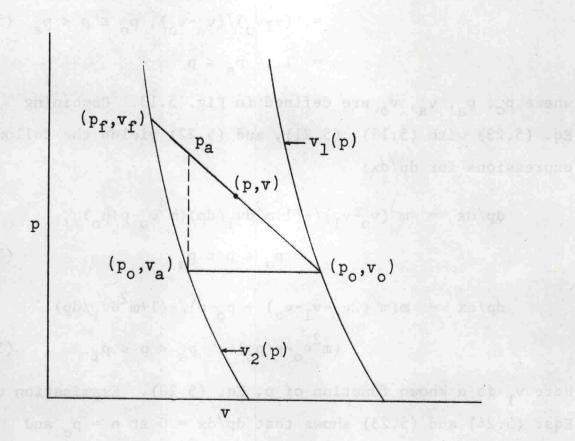


Fig. 5.17 .- Path of the Permanent Regime Solution

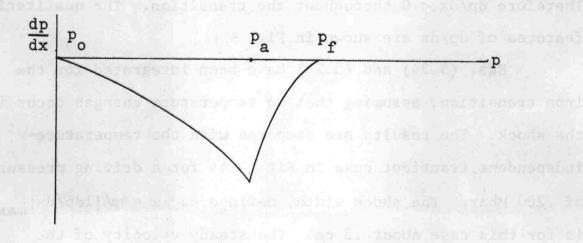


Fig. 5.18 -- dp/dx for Permanent Regime Solution