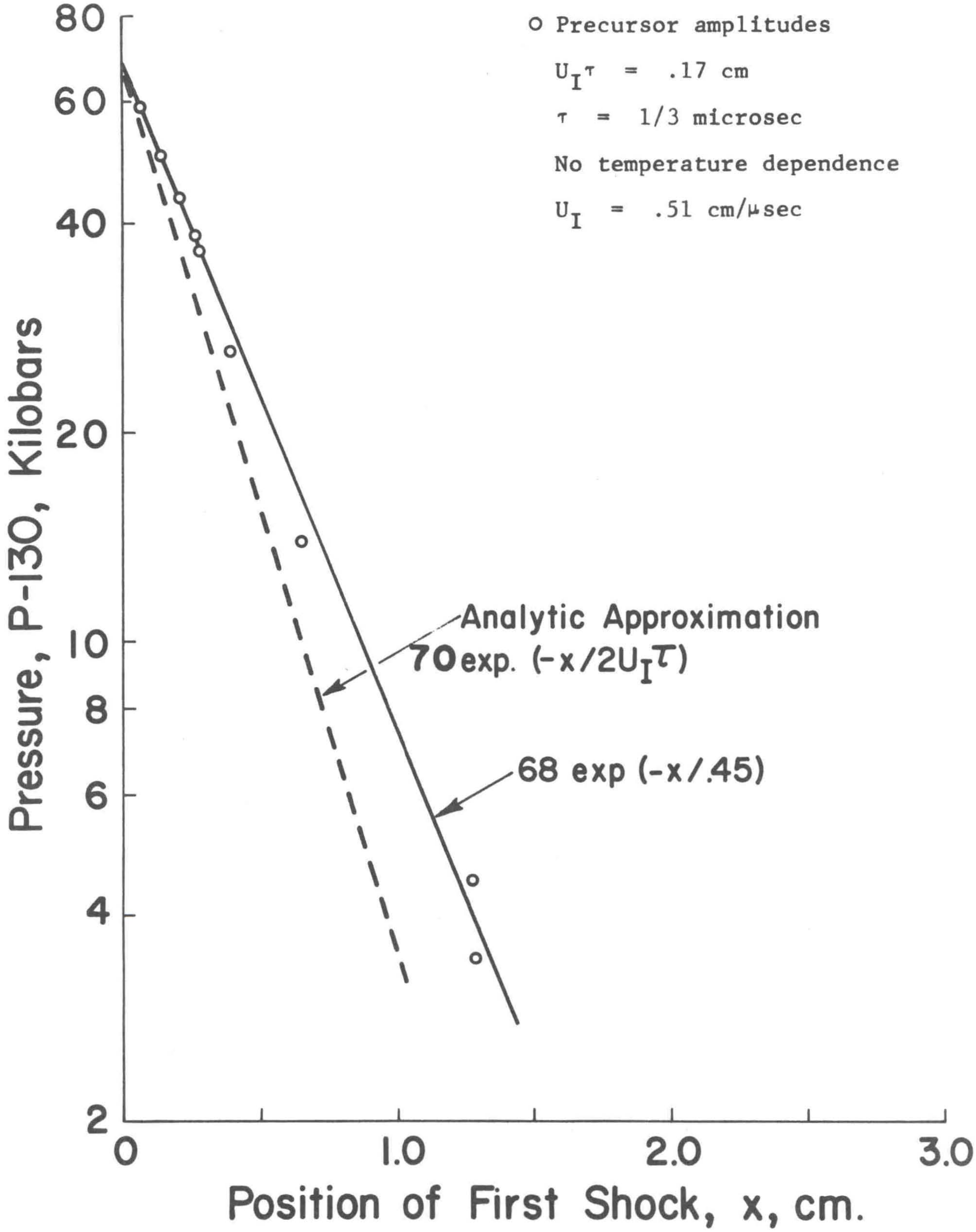

Fig. 5.13.--Decay of First Shock in Iron Resulting from Phase Transition.

If $v_1(p)$ is linear, then

$$\alpha_{eq} = \begin{cases} 1 , & v_1 \le v_m - \Delta v \\ (v_m - v_1)/\Delta v = (p_m - p_1)(dv_1/dp)/\Delta v , & v_m - \Delta v \le v_1 \le v_m \\ 0 , & v_m \le v_1 \end{cases}$$

Here v_m and p_m are pressure and volume where the Hugoniot first enters the mixed phase. These expressions yield

$$\begin{aligned} p_1 &= p_D + (x \,\Delta\, v/2U\tau)\, dp/dv_1 , \quad v_1 \le v_m - \Delta v \\ &= p_m + (p_D - p_m) \exp(-x/2U\tau) , \\ & \qquad\qquad v_m - \Delta v \le v_1 \le v_m \\ &= 0 \qquad v_m \le v_1 \end{aligned}$$

where $x = Ut$. Figure (5.17) shows that in the present case (p_D = driving pressure = 200 kbar), the central formula applies, therefore we should expect to find that

$$p_1 - 130 = 70 \exp(-x/2U\tau)$$

The difference between this curve and the numerical results, shown in Fig. 5.13, is due to non-linear effects.

In Figs. 5.5 and 5.11 there are arrows labelled A and B. These indicate the shock front position which would be predicted at the indicated times from the Rankine-Hugoniot jump conditions: A for the first shock, B for the second. The difference between this predicted arrival time and the one obtained in the