

Both pressure and α are shown in Fig. 5.12 as functions of time at .01 cm from the surface for 3 values of C_L . The behavior of α^{eq} is sensitive to C_L ; it reflects the fluctuations in p . α , on the other hand, is relatively independent of C_L ; its behavior is controlled by the relaxation time τ . This suggests that the decay in amplitude of the first wave is essentially independent of the artificial viscosity.

The decay of the precursor is shown in Fig. 5.13. The rate of decay at early times is closely related to a simple exponential, as shown.

This behavior is plausible on the basis of the following model. Eq. (3.23) can be written

$$dp/dt = a^2 dp/dt + (m_1 n_2 - m_2 n_1) f(v_1 \tau, \alpha) / G$$

This is the analog of Eq. (9) in reference (50). By the same arguments used there, we can arrive at the analog of Eq. (19) of ref. (50):

$$dp_1/dt = - (m_1 n_2 - m_2 n_1) (\alpha_{eq} - \alpha) / \tau G$$

providing the path of the number one shock lies along a characteristic, which is nearly true. Here p_1 is pressure at the peak of the first shock, assumed to be a discontinuity, hence it lies on the metastable surface $v_1(p, T)$. With this condition, $\alpha \approx 0$. Now with the sweeping approximations that $v_1 - v_2 = \Delta v = \text{constant}$, that the entire process is temperature independent, and that $C_{p1} = C_{p2}$, we obtain for the decay equation:

$$dp_1/dt = (\Delta v \alpha_{eq} / 2\tau) dp/dv_1 .$$

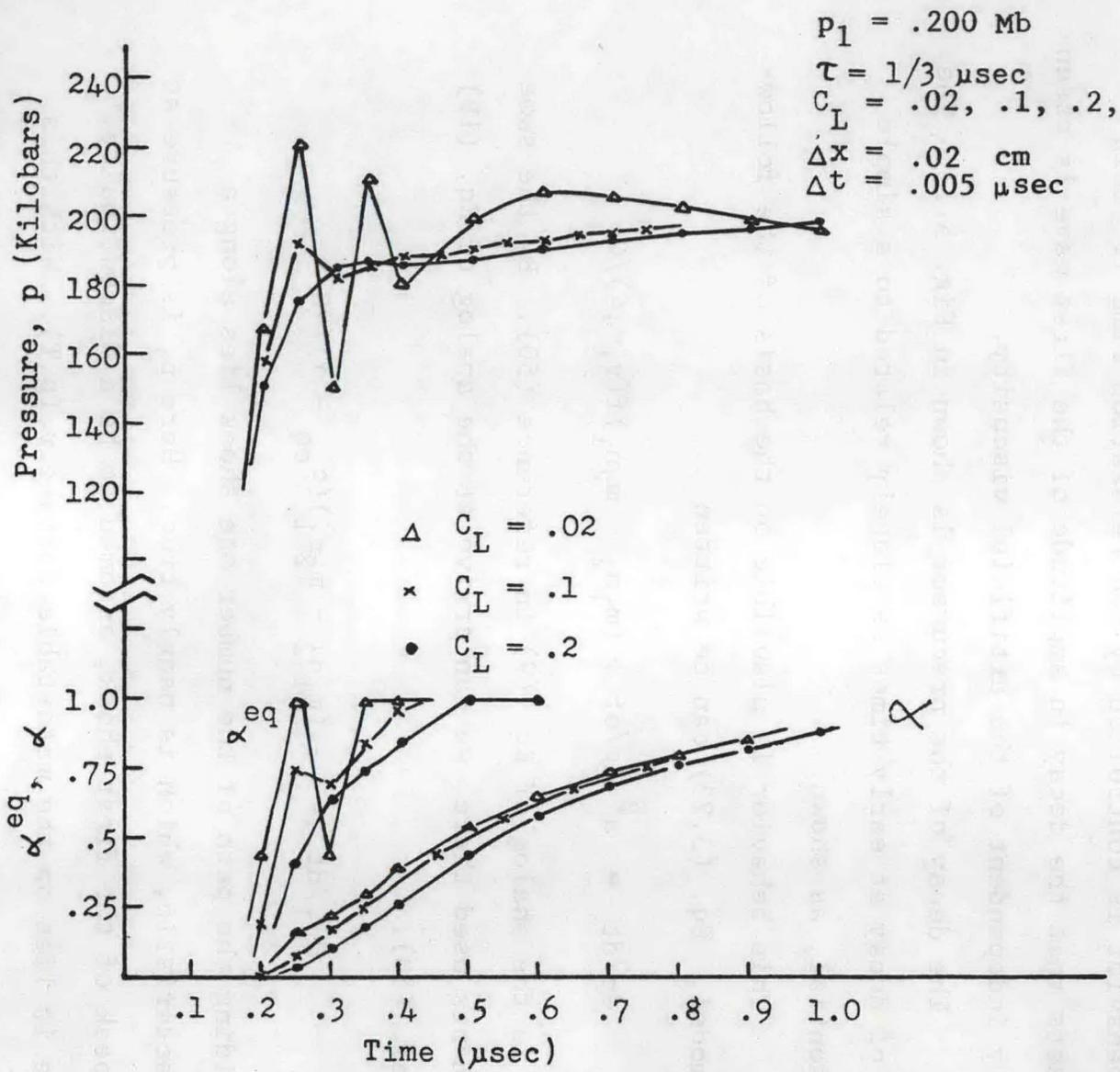


Fig.5.12--q and Speed of Transformation at Fifth Cell