$$\frac{U_{p2}}{U_{p1}} = \frac{2\rho_0 U_{s1}}{\rho_0 U_{s1} + \rho_0' U_{s2}} \tag{22}$$

and

$$\frac{P_2}{P_1} = \frac{2\rho_0' U_{s2}}{\rho_0 U_{s1} + \rho_0' U_{s2}} \ . \tag{23}$$

The expressions for the ratio between the two mass velocities and between the two pressures were derived without stating which medium had the larger impedance. Whether the wave reflected back into medium 1 is a reflected shock wave or a rarefaction wave depends upon the relative magnitudes of the impedances. If medium 1 has a smaller impedance than medium 2, the wave sent back into the compressed state of medium 1 will be a reflected shock wave. Conversely, a rarefaction wave is reflected back into medium 1 when medium 1 has the larger impedance. A shock wave is transmitted into medium 2 regardless of the impedances. The pressure profiles for these two cases are illustrated in Fig. 4. Equations (22) and (23) can be used to calculate the approximate values of mass velocity and pressure in medium 2 if, along with the shock velocity measurements, the pressure in medium 1 is known. Case II of Fig. 4 represents the present experimental arrangement in which medium 1 is aluminum and medium 2 is the liquid.

E. Impedance Matching

An alternative and more useful approach to the preceding analysis can be developed if the interaction of a shock wave with an interface is examined in the pressure versus particle velocity plane. The curve in this plane starting from the origin represents the locus