

CHAPTER 4

EXPERIMENTAL RESULTS

Experimental results for two precursor experiments, one transmission experiment on a thick sample, and eight transmission experiments on thin samples are reported in this chapter. Stresses behind shock fronts were inferred from measured free surface velocity and average shock velocity. Elastic data required for calculation of stress behind the plastic I shocks were taken from Taylor and Rice's paper on Armco iron.³⁶

Errors have been reported in the shorthand form " $A \pm \epsilon$ " where ϵ is the average deviation of A . Appendix C treats the error analysis in some detail.

4.1. Elastic Precursor Data

Two precursor experiments were performed for different driving stresses. Sample thicknesses were 3.1 and 6.3 mm; results are summarized in Table 4.1 and in Fig. 4.1. The final stresses in iron were determined by the intersection of the equilibrium P-u curve of iron and the reflected P-u curve of aluminum, the aluminum curve being centered at $P=0$ and $u =$ projectile velocity.

The solid line in Fig. 4.1 was inferred from Taylor and Rice's³⁶ free surface velocities. Precursor stresses reported here are slightly lower than the solid line in Fig. 4.1.

TABLE 4.1.--Elastic precursor amplitudes in Armco iron

Sample Thickness (mm)	Stress in Quartz (kbar)	Precursor Stress in Iron (kbar)	Flier Plate Velocity (mm/ μ sec)	Driving Stress in Iron (kbar)
3.15	5.99	12.60 \pm 0.54	0.346 ^a	41.1
6.38	4.89	10.28 \pm 0.52	0.486 ^a	54.5

^aFlier plate material was 6061 T-6 aluminum.