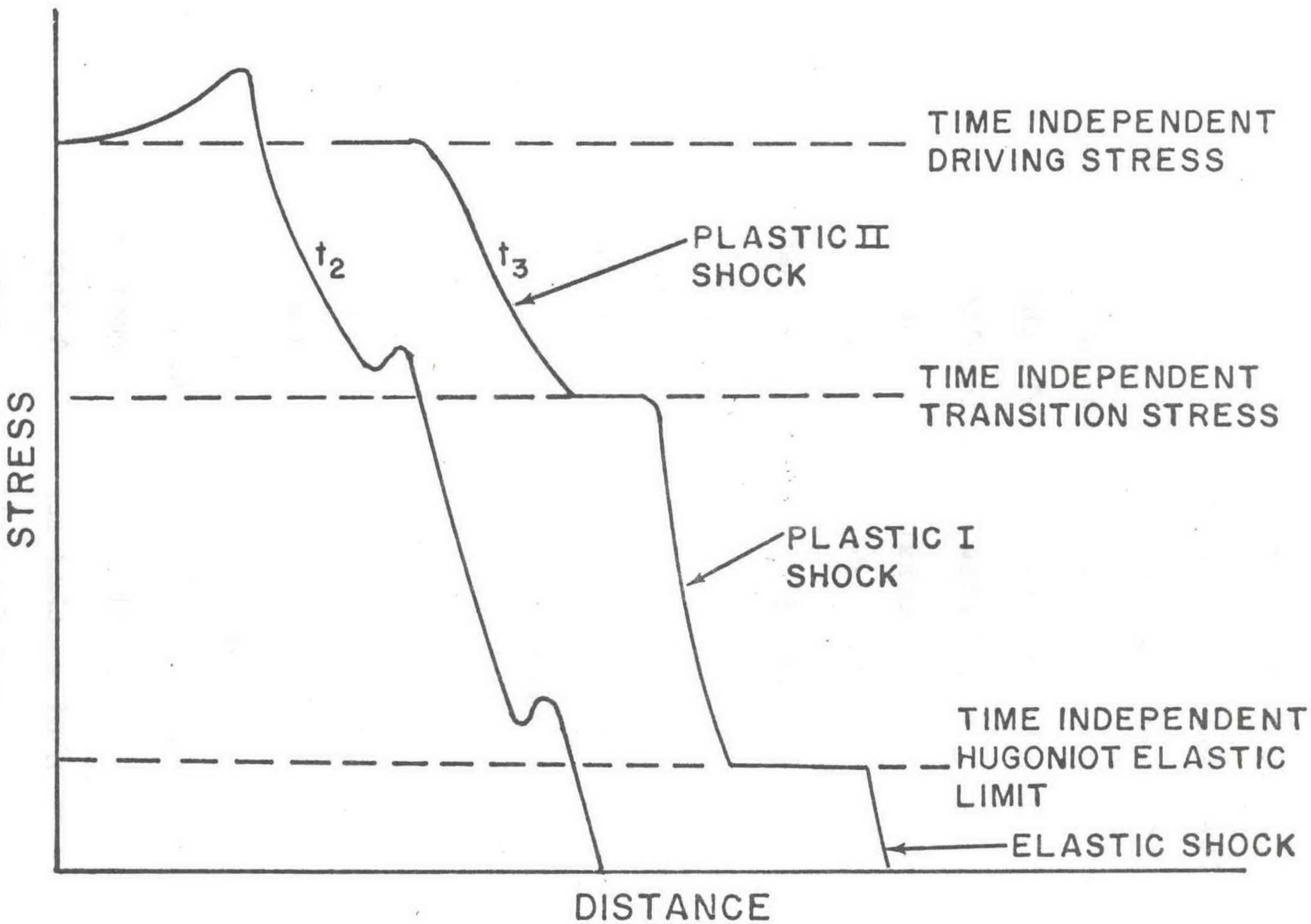

Fig. 1.1.--Two shock wave stress-distance profiles in iron for times t_2 and t_3 where $t_2 < t_3$.

The plastic I wave stress exceeds its eventual time-independent value near the impact boundary, and time required for the stress to decay to its time-independent value is related to kinetics of the transformation. Minshall and his co-workers,[2,22] measured a slow decay in the plastic I wave stress as a function of thickness for a decaying driving stress. The plastic I stress was about 140 kbar in a sample 6-mm thick; it decayed to 130 kbar in a sample 40-mm thick. In the present experimental work I measured a similar slow decay in plastic I stress as a function of thickness for constant final driving stress. The plastic I stress was about 139 kbar for a 1-mm-thick sample and decayed to 131 kbar in a 25-mm-thick sample. Final driving stress was near 200 kbar. Barker and Hollenbach[15] measured a small increase in the plastic I stress with increase of final driving stress for constant sample thickness; amplitude of stress behind the plastic I shock increased by 6 kbar when final driving stress changed from 130 kbar to 300 kbar for 6.35-mm-thick samples.[15]

The transformation process occurs principally in the plastic II shock front; therefore, the rate of transformation may contribute significantly to rise time of this wave. I and a number of experimenters[15,23] have measured rise times of 0.2 to 0.3 μsec for the plastic II shock front in iron by monitoring surface motion of shocked samples. A less accurate method of obtaining rise time information is from residual metallurgical effects,[24,25] which imply shock front thickness; for an approximately steady wave, rise time is obtained by dividing shock front