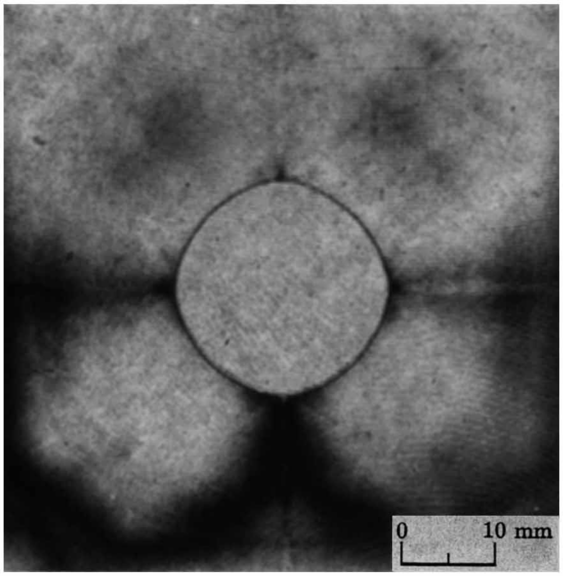

Figure 1

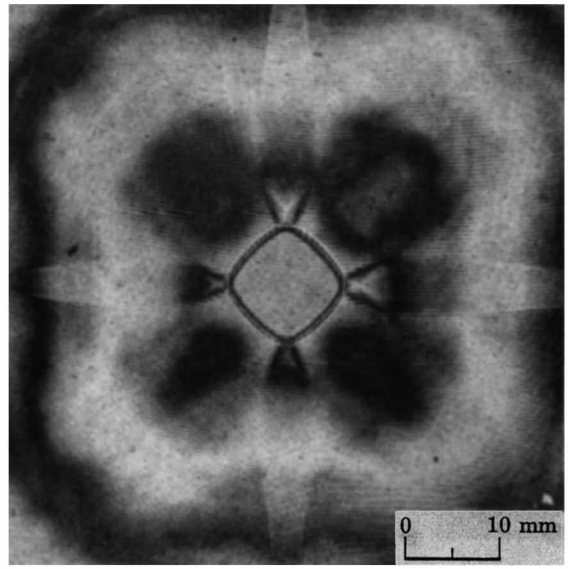

Figure 2

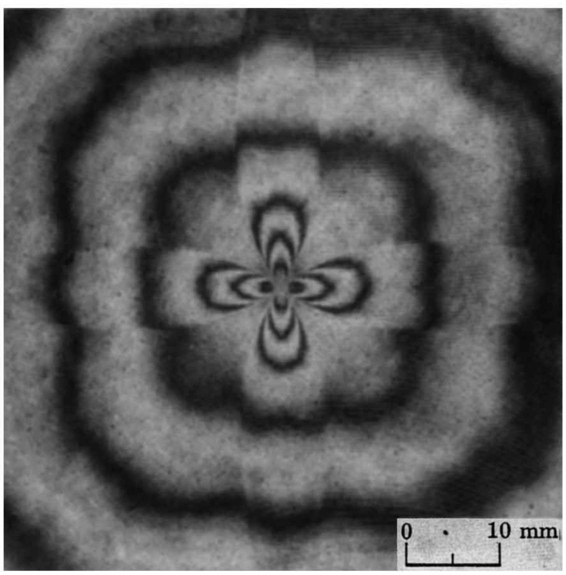

Figure 3

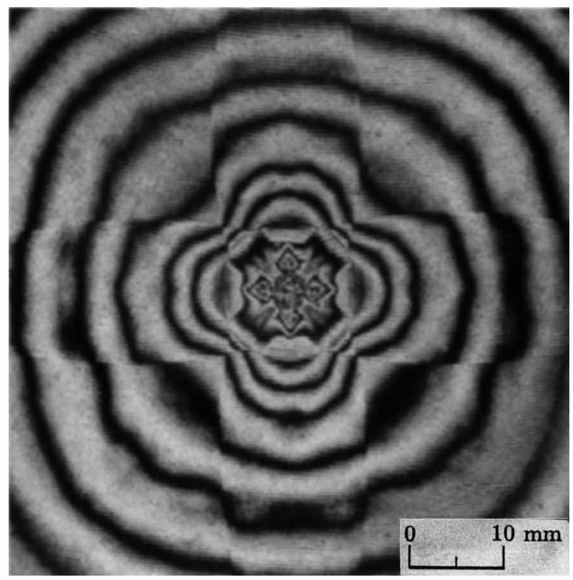

Figure 4

CONVERGING CYLINDRICAL SHOCK WAVE

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Converging toward the center, a cylindrical shock wave becomes unstable. Experimentally, to examine this mechanism, holographic interferometric observation has been conducted. A converging cylindrical shock wave was made by turning a ring-shaped shock wave by 90° in an annular shock tube. Four sequential interferograms show how an initially cylindrically shaped shock deforms when converging toward the center. The initial shock Mach number was 2.0 in air. Flow visualization was carried out by means of double-pulse holographic interferometry.

Although the initial shape was perfectly cylindrical, it was slightly deformed into a quasisquare (Fig. 1). This was attributable to the effect of the four struts that were supporting the inner core of the annular shock tube. The effect of the struts seemed to be too small to disturb initial cylindrical shock configuration, however, these linear perturbations grew up and from a certain stage the continuous density profile behind the converging quasicylindrical shock wave failed to exist and resulted in the discontinuous distribution (Fig. 2). The four pairs of the Mach reflection appear (see Fig. 3). The fringes are corresponding to isopicnics and their pattern reminds one of a four-leaved clover. The triple points of these Mach reflections accompany the vortices and reflected shock waves. Very close to the center where the triple points meet, these Mach reflections were the so-called inverted Mach reflection. After collapsing at the center, the shock wave, which was dragging complicated wave interaction behind it, was reflected and became a stable diverging shock wave. The cross-shaped pattern near the center was the remaining vortices and they looked like mushrooms (Fig. 4).