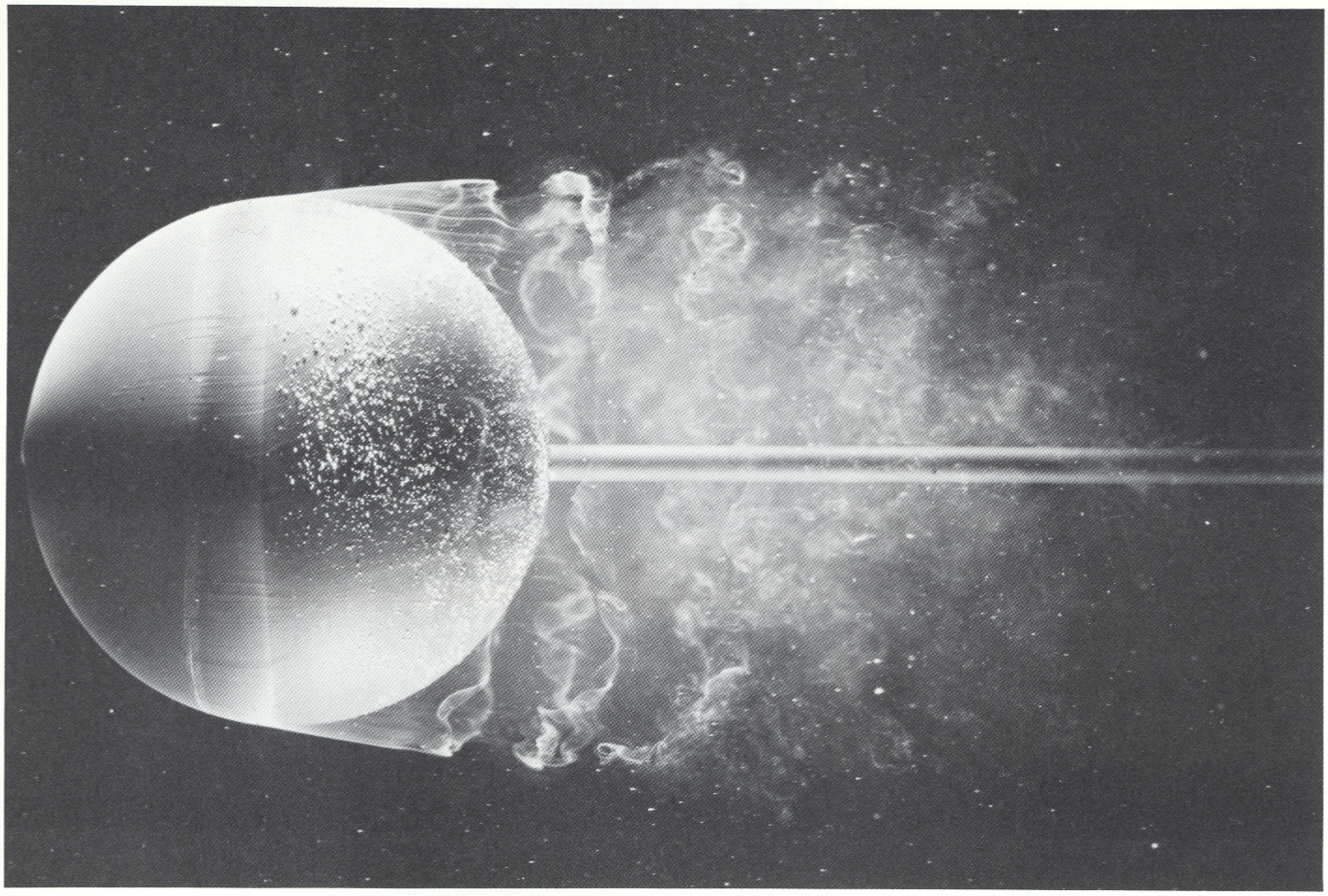
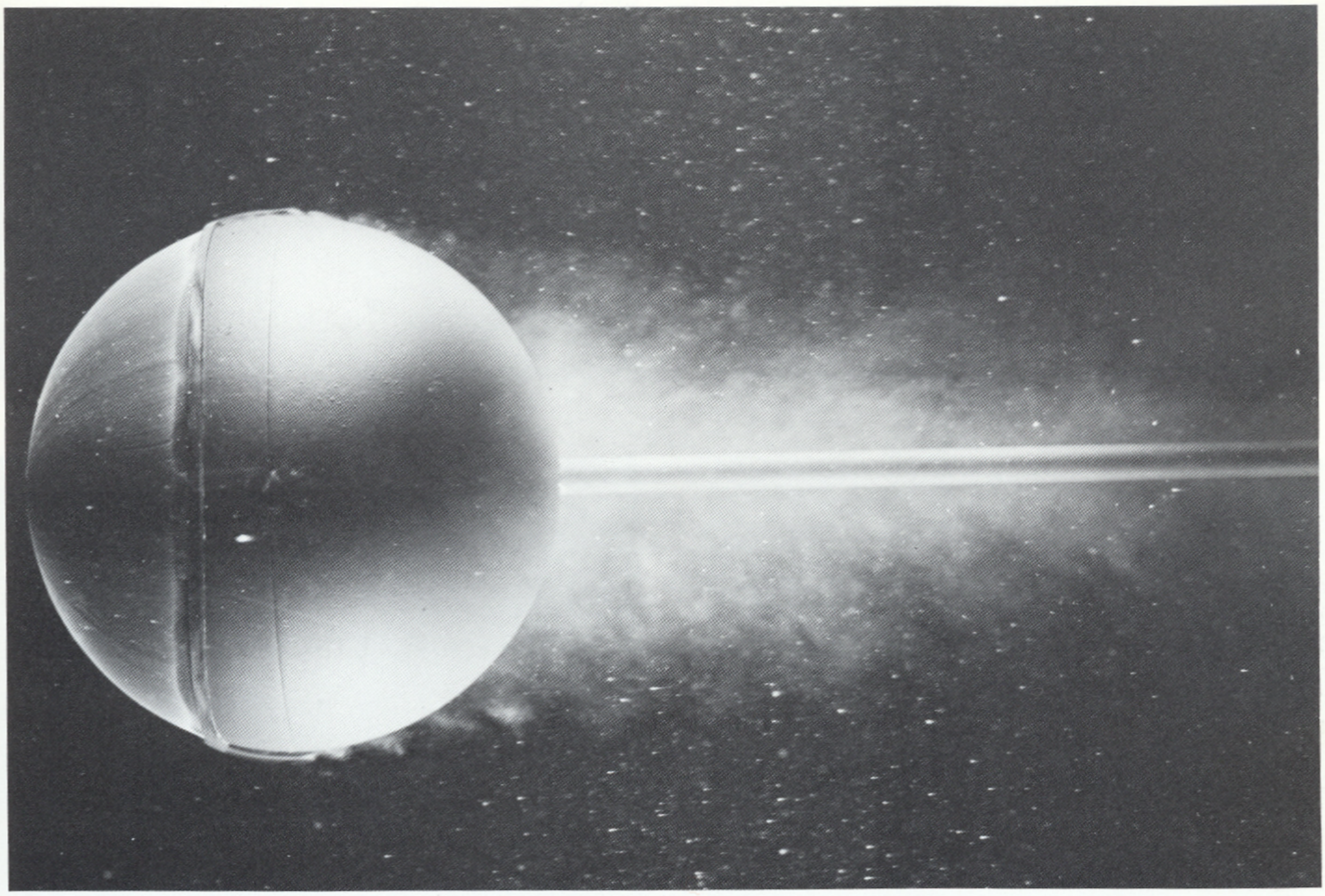
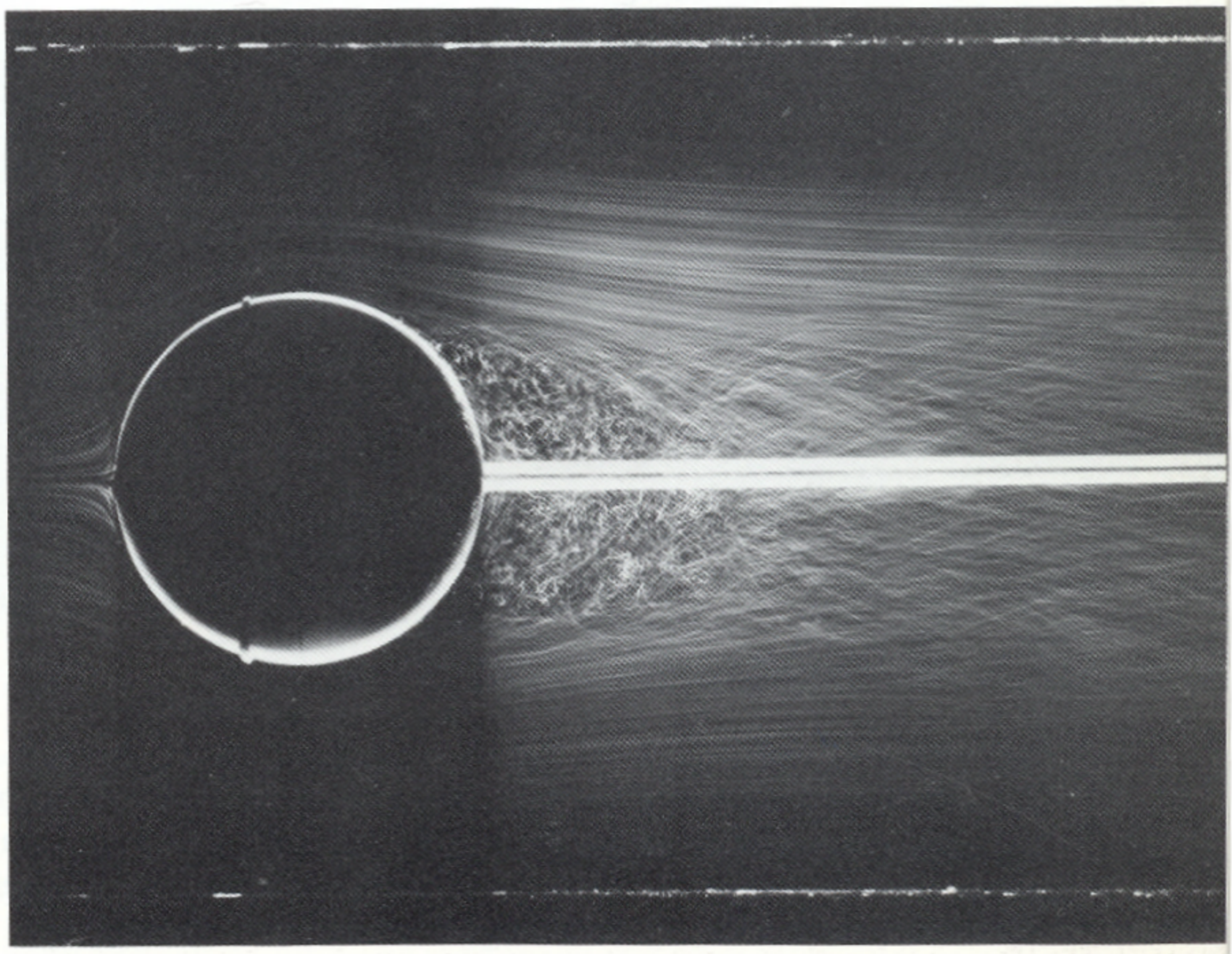


55. Instantaneous flow past a sphere at R=15,000. Dye in water shows a laminar boundary layer separating ahead of the equator and remaining laminar for almost one radius. It then becomes unstable and quickly turns turbulent. *ONERA photograph, Werlé 1980*

56. Mean flow past a sphere at R=15,000. A time exposure of air bubbles in water shows an averaged streamline pattern in the meridian plane for the flow that was photographed instantaneously above. *ONERA photograph by Henri Werlé*



57. Instantaneous flow past a sphere at $R=30{,}000$ with a trip wire. A classical experiment of Prandtl and Wieselsberger is repeated here, using air bubbles in water. A wire hoop ahead of the equator trips the boundary layer. It becomes turbulent, so that it separates farther rearward than if it were laminar (opposite page). The drag is thereby dramatically reduced, in a way that occurs naturally on a smooth sphere only at a Reynolds number ten times as great. *ONERA photograph, Werlé 1980*



58. Mean flow past a sphere at $R=30{,}000$ with a trip wire. A time-averaged photograph of the flow above in the meridian plane, visualized by air bubbles in water, shows clearly how the size of the wake is reduced when the boundary layer is turbulent. *ONERA photograph, Werlé 1980*