Turbulent Spots

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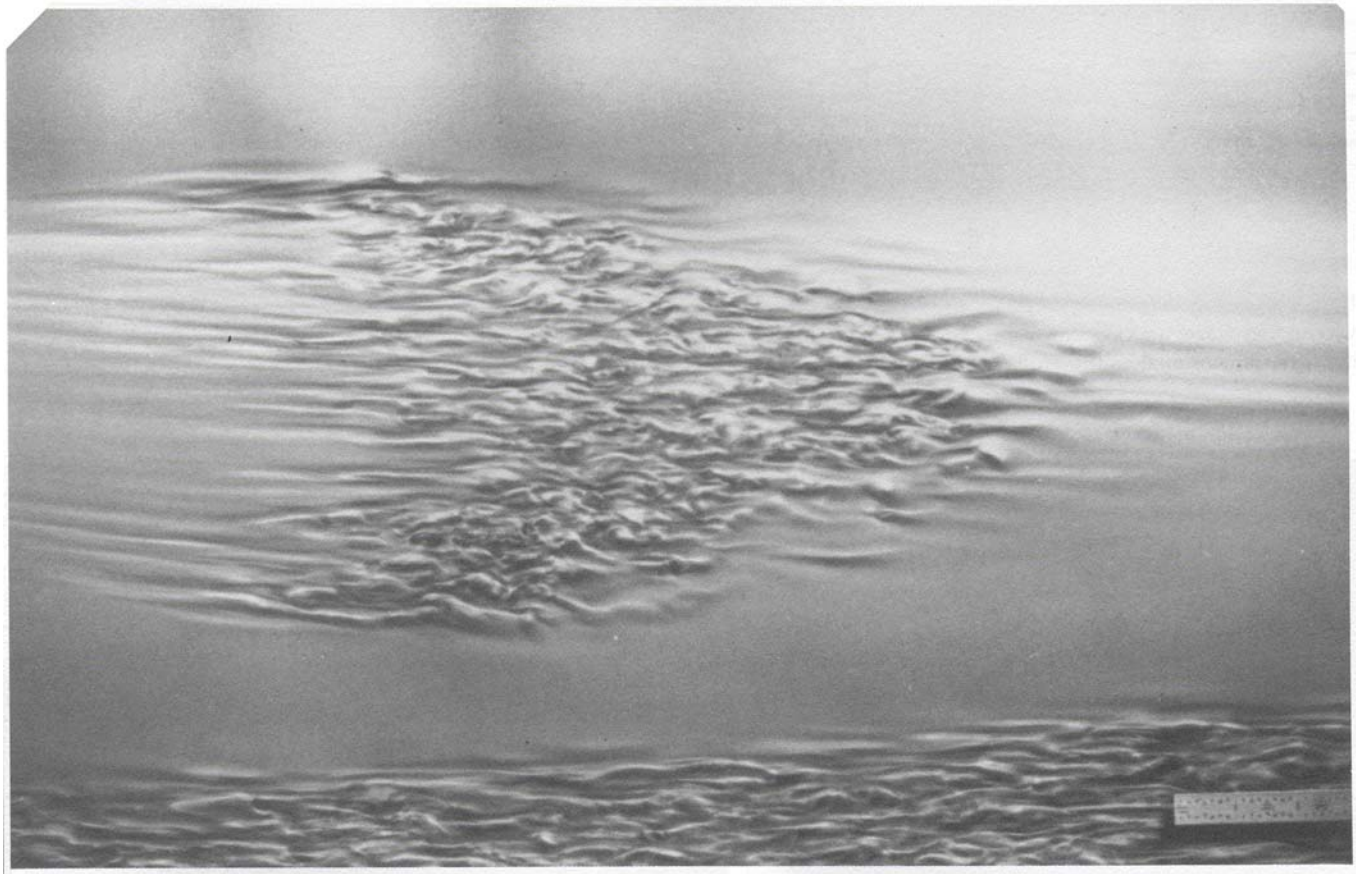
1. Top and cross-sectional views – turbulent spots

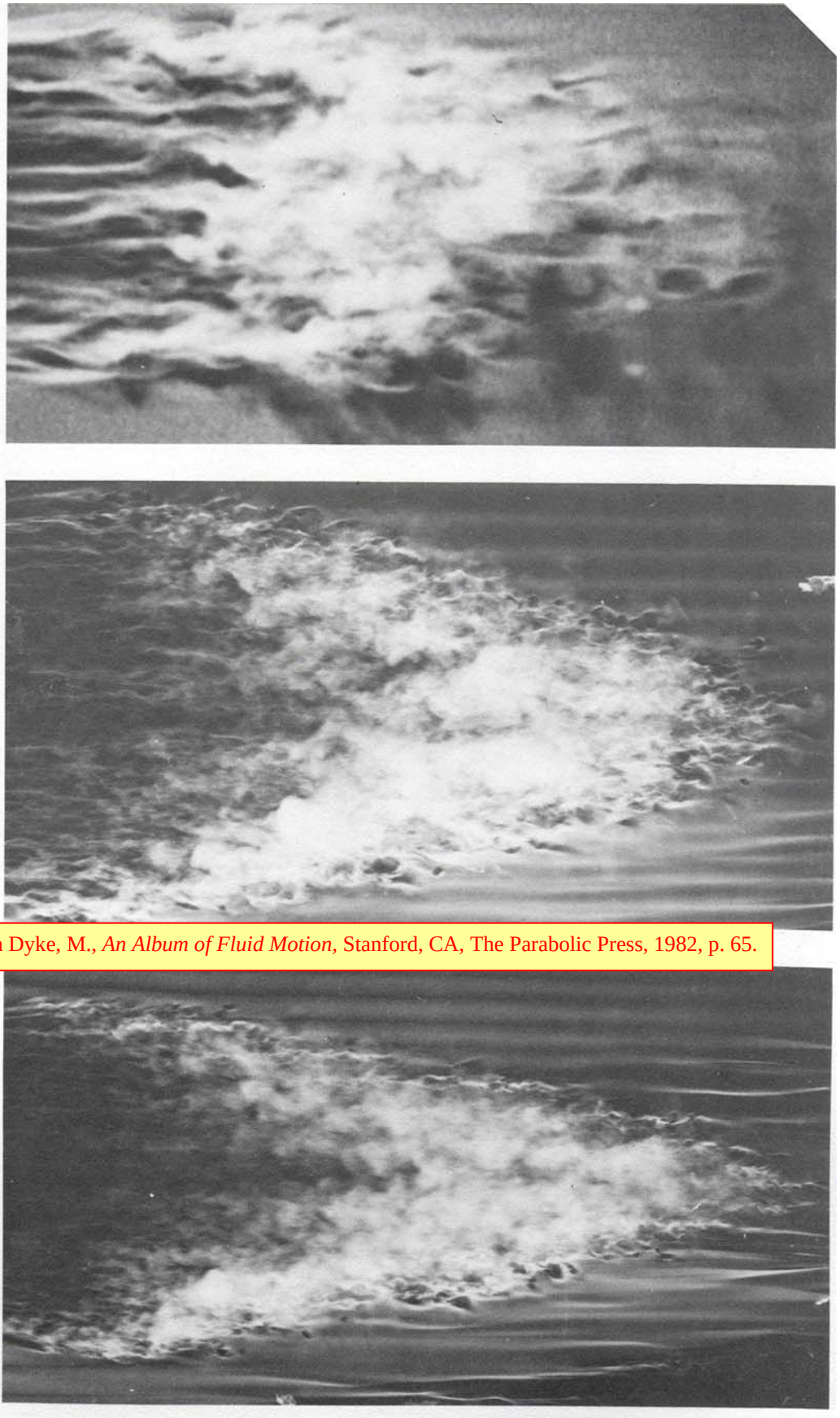


109. Emmons turbulent spot. On a flat plate, transition from a laminar to a turbulent boundary layer proceeds intermittently through the spontaneous random appearance of spots of turbulence. Each spot grows approximately linearly with distance while moving downstream at a fraction of the free-stream speed, and maintaining the characteristic arrowhead shape that is shown here by a suspension of aluminum flakes in water. Transverse contamination is seen spreading from the bottom of the channel. At the center of the spot the Reynolds number is 200,000 based on distance from the leading edge. *Cantwell, Coles & Dimotakis 1978*

110. Cross section of a turbulent spot. A turbulent spot at an early stage of development is seen in a cross section normal to the stream. Smoke in a wind tunnel is illuminated by a sheet of laser light. *Perry, Lim & Teh 1981*

From: Van Dyke, M., *An Album of Fluid Motion*, Stanford, CA, The Parabolic Press, 1982, p. 64.

2. Turbulent spots as Reynolds number increases



From: Van Dyke, M., *An Album of Fluid Motion*, Stanford, CA, The Parabolic Press, 1982, p. 65.

111. Turbulent spot at different Reynolds numbers. The outline of the spot becomes more regular, and the angle of its leading edge steeper, as the Reynolds number increases. Visualization is by smoke in air with flood lighting. *Photograph by R. E. Falco*