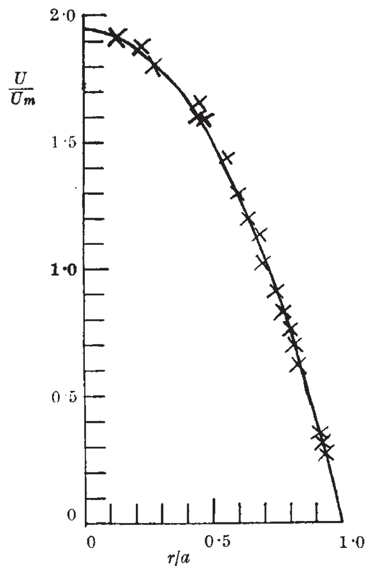

Fig. 2

As an illustration of the method, Fig. 2 shows the velocity distribution calculated from the experimental observations, recorded at a point 83 diameters from the entry, for the flow of water through a circular pipe at a Reynolds number of 2,200. The flow is laminar at this high Reynolds number due to a flared entry into the pipe from the reservoir. The full line is the calculated velocity distribution after Schiller and Nikuradse taken from Goldstein[3]. These results are taken from several frames, and some of the scatter is due to interference of the drops with each other and to the uncertainty of repeating the exact time interval in successive double flashes.

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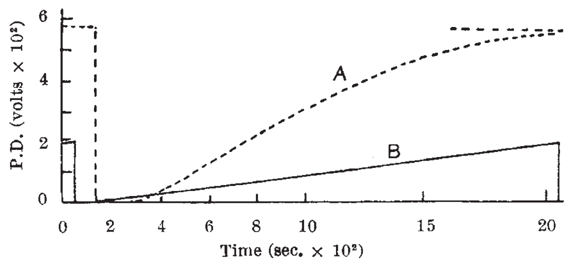
The Dropping Mercury Electrode

When a drop falls from a mercury jet dipping into an electrolytic solution, it has been assumed that the new mercury surface exposed in the jet is uncharged, and that the charging of the surface takes place comparatively slowly, so that if the drops follow one another very quickly, there will be no time for the mercury ions to pass from the solution to the mercury drop before the latter breaks away ; in other words, there is no potential difference between the mercury in the jet and the solution immediately in contact with it.

During recent experiments with such jets, it has been found that even at the highest attainable rate of dropping some positive charge is deposited upon each newly formed drop, although there is a time interval during the formation of a single drop during which the potential difference between the newly formed drop and the surrounding electrolyte remains constant. This variation of potential difference with time was investigated by means of a cathode ray oscillograph. A normal calomel half-element was used in series with the dropping mercury electrode, and the potential difference in the complete unit was amplified and relayed to a cathode ray oscillograph having a calibrated time base. The resulting traces on the screen were photographed and analysed.

The results show that during the drop formation at the end of the jet there is a time interval during which no positive charge collects on the drop, and that this time interval decreases as the rate of dropping increases. Thus with a drop formation of 2 sec. no charge on the drop was detected for 0·014 sec., whereas with a formation time of 0·2 sec. this time interval was 0·007 sec. These results are shown in the accompanying graph, where curve *A* represents the variation of potential difference with time during the formation of the 2-sec. drop and curve *B* that for the 0·2-sec. drop.



The variation in the time-interval during which the potential difference remains constant can be explained by diffusion of the mercury ions in solution towards the jet. The positive charge on the surface of the drop increases, and the concentration of mercury ions in the immediate neighbourhood of the surface decreases. Thus when another drop is formed, there is a time lag between the commencement of formation and deposition of mercury ions upon the surface, and this time lag depends upon the concentration of mercury ions near the surface, that is, upon the rate of dropping. A higher rate of dropping will produce a smaller change in the concentration of mercury ions.

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Action Potentials in the Cerebral Cortex

Monophasic action potentials of little more than 1 m.sec. duration and of up to 35 mV. amplitude have been recorded from the cerebral cortex of the cat and the rabbit. The steel micro-electrodes used were reduced electrolytically[1,2] to a shaft diameter of about 100 µ, copper plated, and insulated with varnish to the tip, which was platinized and of less than 5 µ diameter. Such electrodes of about 5 mm. length were mounted to project 0·5–2·0 mm. from small 'Perspex' squares, and flexibly connected to a high-impedance input stage and D.C. amplifier[3].

As well as occurring spontaneously, these action potentials have been found in the primary visual