as v, there can be added any number of other functions such as y, provided that $\int_0^R yrdr = 0$. The added functions will not affect the efflux, since $E = 2\pi\int_0^R vrdr$, but they will alter the kinetic energy term. Hypothetical y functions can be invented which satisfy all the known physical limitations to which v is subject. Because of this, even the agreement between theory and experiment shown by liquids obeying the law of Poisseuille, does not prove that the velocity function is uniquely determined.

The kinetic energy correction can therefore assume values other than those calculated by the usual methods. It is possible that the anomalous turbidity shown by ammonium oleate solutions, where turbulent flow starts at low values of the Reynold's number, may be associated with a large kinetic energy correction which originates in the above manner.

If the above limitation is ignored, the calculation for a viscous liquid yields the accepted kinetic energy term. For plastic flow, as defined by Bingham, the kinetic energy correction is identical with an empirical term which is often employed.

This paper will be published in one of the early numbers of "Rheology" (rhe-flow) a new quarterly dealing with phenomena connected with the flow of matter.

S. Bradford Stone

College of the City of New York
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The Nature of the Electrodeless Ring Discharge

There seems to be a misunderstanding as to the nature of the electric forces which produce an electrodeless ring discharge. It is commonly thought that the only force involved is the electromagnetic force due to the variation of the magnetic field and hence it is supposed that the electrons in the discharge move in circles around the axis of the solenoid. J. S. Townsend and R. H. Donaldson (Phil. Mag. **5**, 178, 1928) have shown that the electric force due to electric charges on the solenoid is generally very large compared to the electromagnetic force. During the course of some work on an electrodeless ring discharge, the writer has run across two lines of evidence which point to the same conclusion.

To produce the electrodeless discharge, the writer used an ordinary Colpitts circuit whose inductance, a solenoid of 15 turns, surrounded a cylindrical discharge tube containing hydrogen at 0.03 mm pressure. With the circuit oscillating at 50 meters and a tank current of about 7 amperes, a relatively intense discharge was produced. In order to increase the wave-length, additional inductance consisting of a coil of 7 turns was inserted in series with the exciting coil. However, these additional 7 turns did not surround the discharge tube. Under these conditions, the circuit oscillated at 100 meters with over 10 amperes in the tank circuit but *no discharge was produced.* As soon as the 7 additional turns were wrapped around the discharge tube as an extension of the original coil, a very nice discharge was obtained, and all other conditions were apparently the same as before. This then, seems to indicate that the *functioning of the electrodeless ring discharge depends primarily not on the current through the exciting coil but upon the potential difference between the ends of the coil.*

Another simple experiment, which would show whether the electric forces producing an electrodeless ring discharge were electromagnetic or electrostatic in nature, was suggested to the writer by Dr. G. Breit. The exciting coil was increased in diameter until there was about 2 cm clearance between coil and tube. Under these conditions, a discharge could still be obtained in the tube. Now a grounded cylinder of copper gauze closely fitting the discharge tube was inserted between the exciting coil and tube. This shield should have no effect on electromagetic forces in the discharge tube, but would completely screen it from any electrostatic forces. It was found that as soon as the tube was surrounded by the shield, the discharge ceased. Thus we must conclude that *the electrodeless ring discharge is an electrostatic and not an electromagnetic phenomenon.*

Charles J. Brasefield

University of Michigan,
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