Proceedings of the Iowa Academy of Science

Volume 33 | Annual Issue Article 75

1926

Variation of the Intensity of the Spectral Lines of Mercury with the Velocity of the Exciting Electrons

W. D. Crozier
State University of Iowa

those formerly known. Experimental tests verify the correctness of the theory.

State University of Iowa,
Iowa City, Iowa.

DIRECT ABSOLUTE MEASUREMENT OF ACOUSTIC IMPEDANCE

G. W. Stewart

(ABSTRACT)

Advantage is taken of the author's theory of the transmission in an acoustic line with an attached branch which alters the intensity and the pressure phase of the transmitted sound. By the measurement of the relative intensities and phases with and without the branch present, it is possible to obtain the components Z_1 and Z_2 of the impedance, $Z = Z_1 + iZ_2$, of the branch. If s is the area of the conduit, P_0 and P'_0 the two pressure amplitudes, ε the change in phase, ρ the density of the medium, a the velocity of sound therein,

$$Z_1 = (\rho a/2s)\ [A/(A^2 + B^2)] \text{ and } Z_2 = (\rho a/2s)\ [B/(A^2 + B\ )],$$

wherein $A = (P_0/P'_0 \cos \varepsilon - 1$ and $B = - (P_0/P_0) \sin \varepsilon$.

The method involves only the *relative* magnitudes of pressure amplitudes and the direct measurement of phase change. In the present application the pressure ratio is determined by altering a comparison source, and the phase is measured directly. The method involves only one simple absolute measurement and is a strictly acoustic method somewhat analogous to methods of measurement long used in electricity.

State Universty of Iowa,
Iowa City, Iowa.

VARIATION OF THE INTENSITY OF THE SPECTRAL LINES OF MERCURY WITH THE VELOCITY OF THE EXCITING ELECTRONS

W. D. Crozier

(ABSTRACT)

A study has been made of the variation of the intensity of the spectral lines of mercury when excited by impact of electrons of

controlled velocity. In accordance with some earlier observations by Dr. J. A. Eldridge, it is found that the lines divide into two classes. In one class the intensity of the line increases uniformly from zero to a certain limit as the velocity of the electrons increases above the minimum exciting velocity. In the other class the intensity rises rapidly to a maximum at a velocity not far above the minimum exciting velocity, and then decreases to a certain limit. The lines which have so far been found to be in the first class are: $2p_2$-2S, $2p_2$-$4d_2$, 2P-mD (m = 5, 6, 7, 8), $2p_2$-$3d_2$, $2p_1$-$3d_2$; $2p_2$-4D: and in the second class; $2p_1$-3s, $2p_3$-2s, $2p_1$-4s, 2P-4S, $2p_1$-$4d_1$, $2p_1$-$3d_1$.

STATE UNIVERSTY OF IOWA,
IOWA CITY, IOWA.

ELECTRICTY AND MECHANICS

JOHN A. ELDRIDGE

When electric charges are in motion the forces between them differ from the electrostatic forces. The magnetic concept is used to take account of these non-electrostatic forces. The magnetic effect of a moving charge is relative to the electrostatic extremely small except when the velocity approaches that of light. However due to the circumstance that the electrostatic effects often, as in a wire carrying a current, practically cancel, the magnetic forces are very important.

According to our present beliefs any field of force changes in an analogous manner if it be moved. There is theoretically the same excuse for speaking of a magnetic field about a moving mass as a moving charge. The difference is that in this latter case the discrepancy from the gravitostatic force is not of practical importance.

STATE UNIVERSITY OF IOWA,
IOWA CITY, IOWA.

THE SCATTERING OF X-RAYS BY CAMPHOR

ROGER M. MORROW

(ABSTRACT)

The ionization chamber method of analysis was used. A Soller slit placed between the scattering material and the x-ray tube, gives a wide beam of nearly parallel rays; one placed between the