THE ELECTRO-STATIC FORCES AND THE ELASTICITY CONSTANTS.

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Suppose an ionic lattice consists of equally spaced neutral planes, the equilibrium distance separating these being d. For simplicity, let the x-axis be taken perpendicular to the planes and the planes be numbered $j = \cdots -3, -2, -1, 0, 1, 2, 3, \cdots$ If $\phi(x_j)$ denotes the potential per unit area of the jth plane relative to only one particular plane, say the plane $j = 0$, then U, the energy density of the crystal is given by :

$$U = \frac{1}{2d} \sum_j \phi(x_j). \tag{1}$$

We assume a deformation by which the distance between consecutive planes is uniformly changed. If x_j is the distance of the jth plane from the plane $j = 0$, we have

$$x_j = dj(1 + x_x) ; \tag{2}$$

x_x being the elongation per unit length in the direction of the x-axis.

The expression (1) for the energy density may be developed as :

$$U = \frac{1}{2d} \sum_j \left\{ \phi(dj) + djx_x \left(\frac{\partial\phi}{\partial x}\right)_{x=dj} + \tfrac{1}{2} d^2j^2x_x^2 \left(\frac{\partial^2\phi}{\partial x^2}\right)_{x=dj} + \cdots \right\} ; \tag{3}$$

c_{11}^e, the contribution of the electro-static forces to the elasticity-constant along the direction of the x-axis, will be given by

$$c_1^e = \frac{d}{2} \sum_j j^2 \left(\frac{\partial^2\phi(x_j)}{\partial x^2}\right)_{x=d_j} ; \tag{4}$$

In two papers,[1] the formula for c_{11}^e, used by the author, contained the factor j instead of the correct factor j.[2] This error[2] crept in on account of the misinterpretation of the conception of stress in a lattice. The numerical calculations given in these two papers have been repeated in the light of the correct formula (4). As the formula effects only higher terms of the series representing the elasticity constant, the corrected formula is found to have small influence on the numerical results given in these two papers.

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[1] B. Y. Oke, *Proc. Ind. Acad. Sci.*, 1936, 4, 514 and 667.

[2] The error was brought to notice by the examiners of a dissertation submitted by the author.