



XXXIV. Note on prof. Anderson's "Focometry of lens-combinations"

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vibration-forms may be obtained which are identical with: (a) the motion of a string bowed with suitable pressure close to its centre, or at a distance from it not exceeding a quarter of its length; (b) the motion of a string bowed near an end with pressure insufficient to elicit the fundamental pre-eminent; and (c) the successive stages of the vibration obtained by bowing a string near an end at the "wolf-note" pitch, or under certain other circumstances in which *cyclical*, not periodic, vibrations are obtained.

The photographic records are in complete accord with theory, and are an interesting illustration of the experimental analysis of discontinuous vibration-forms.

The experiments described in this note were carried out in the Laboratory of the Indian Association for the Cultivation of Science.

Calcutta,
November 8th, 1916.

XXXIV. Note on Prof. Anderson's "Focometry of Lens-Combinations." By ROBERT E. BAYNES, M.A.*

PROF. ANDERSON'S method (p. 157) of determining the focal length of a combination is most interesting, but the degree of its exactness requires examination; for the data given in the paper for a particular case, viz. $x_1=51.0$, $y_1=9.0$, $x_2=24.5$, $y_2=9.5$, $d=26.9$, lead to curious results when treated in different ways.

Prof. Anderson's formula

$$f = d \div (x_1/y_1 - x_2/y_2)$$

gives $f=8.71$, but the distance between the nodal planes when calculated from this value of f with x_1, y_1 is 8.52 and with x_2, y_2 is 6.58, a difference which cannot be ignored.

The fact is that there is a definite relation between the five given magnitudes, viz.

$$d(1 - y_1 y_2 / x_1 x_2) = (x_1 - y_1) - (x_2 - y_2),$$

which is not satisfied in the above case and which requires $d=29.0$ with the given values of x_1, \dots . With this value of d we should have obtained 9.39 for the focal length and 5.93 for the distance between the nodal planes.

* Communicated by the Author.

One would fancy that, of the measurements given above, those of $d=26\cdot9$, $x_1-y_1=42\cdot0$, $x_2-y_2=15\cdot0$ might be taken as exact almost to a millimetre. Now the above formulæ lead to

$$f = d \div \{x_1/y_1 - d(y_1/x_1) / (d + x_2 - y_2 - x_1 + y_1)\} :$$

and if we take as exact the above given values of x_1 and y_1 with x_2-y_2 and d , we obtain $0\cdot51$ for the focal length and $1\cdot95$ for the distance between the nodal planes; whereas, if we assume as exact the given values of x_2 and y_2 with x_1-y_1 and d (in this case $-26\cdot9$, with interchange of the subscripts in the formula), we find $-0\cdot25$ for the focal length and $15\cdot1$ for the distance between the nodal planes.

It would be interesting to know what is the exact focal length, found otherwise, of the combination in question and the exact reason of these most discrepant results. A method requiring the determination of only one centre of rotation together with two measurements that can easily be made with very fair accuracy would seem *a priori* to be more reliable than one requiring the determination of a second centre of rotation as well.

It may be noted that the point of rotation of the combination in any position is the intersection of its axis with the line joining a point and its image.

Christ Church, Oxford,
Feb. 16, 1917.

XXXV. *On an Automatic Device for charging Electroscopes.*
By L. KOLOWRAT, Assistant at the Mineralogical Laboratory, Imperial Academy of Sciences, Petrograd*.

HAVING had to construct a set of sensitive aluminium-leaf electroscopes for laboratory and field work with radioactive minerals, I have fitted them with a special charging device which, though somewhat elaborate in design, is simple and convenient in use, and may therefore deserve a few words of description. It consists essentially of an ebonite rod *a* which, whilst being pushed down by means of the button *b*, is rubbed against cloth placed at *c*, *e. g.*, in form of a pile of perforated disks. During the subsequent motion, the charge thus produced is collected on the fixed brass tube *d*, insulated by the ebonite collar *e*.

* Communicated by Sir E. Rutherford.