XI. On Fresnel's theory of double refraction

Archibald Smith

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the Russian corruptions Feodor, Marpha, &c. for Theodore, Martha), so that all the labial aspirates would approximate to dentals, and on this principle might it be that the liquid aspirate *Nh* approaches the next order of gutturals.

Should this paper be admitted, I shall hereafter consider some objections that have been communicated to me, and proceed to an attempted analysis of vowel sounds.

C. B. CAYLEY.

XI. *On Fresnel's Theory of Double Refraction.*

By ARCHIBALD SMITH.

To the Editors of the Philosophical Magazine and Journal.

GENTLEMEN,

IN an article on Fresnel's Theory of Double Refraction, in the Supplement to the December Number of the Philosophical Magazine, Mr. Moon has quoted part of an article of mine in the first volume of the Cambridge Mathematical Journal, in which the following passage occurs:—"Let the particle receive a small displacement, the projections of which on the co-ordinate axes are δx , δy , δz . Then supposing the displacement to be very small, *the force of restitution may be taken as proportional to it, so that we have,*" &c. I am not surprised that Mr. Moon should remark on this passage, "what is meant by the mysterious principle 'supposing the displacement to be very small, the force of restitution may be taken as proportional to it,' I profess myself unable to understand."

The clause in italics, which was added to my manuscript when it was sent to the press, to remove, I believe, what was thought an abruptness in the reasoning, is certainly incorrect when applied to a doubly refracting medium. What was intended to be expressed, no doubt, was, that in the case supposed terms involving powers of δx , δy , δz higher than the first might be neglected. But this expression is only equivalent to the other in the case of a singly refracting medium. I may mention that in the middle of page 7 of the article in the Cambridge Mathematical Journal, the word "rays" was, by a mistake, substituted for "waves." These mistakes are corrected in the second edition of the first volume of the Cambridge Mathematical Journal which is now printing. As they have been noticed in your Journal, I shall feel much obliged by your inserting this explanation when you can afford space for it.

Your obedient Servant,

25 Old Square, Lincoln's Inn, Dec. 20.

ARCHIBALD SMITH.