

OPTICS. – *On the coefficient of Fresnel.*  
 Note from **M. CHARLES-L.-R.-E. MENGES.**

My previous note <sup>(1)</sup> was taken by mistake as *confirmation* of the *drag* coefficient. In truth, my result is just opposite.

I showed that by correctly calculating the velocity  $V$  of light in the transparent body which moves with velocity  $\varpi$  in the direction of light rays, we get the formula that accounts for the most accurate recent experiments *by simply adding*  $V$  with  $\varpi$ .

The drag comes from the generally accepted belief that the *incorrect value*  $\frac{c}{\mu'}$  that we have simply and erroneously *attributed* to the speed of light in a moving transparent body; and, which is not at all a result determined by the experiment of Fizeau. I get this value with Fresnel's formula. But the actual speed of light in the conditions of the experiment is

$$V = \frac{c - \varpi}{\mu'_{\varpi}}$$

with

$$\mu'_{\varpi} = \frac{n'}{n} \mu + (n' - n) \frac{d\mu}{dn'} - \frac{n' - n}{n}$$

according to my formula (12).  $V$  is the same speed as measured by a direct method, that of the toothed wheel or rotating mirror, the method being applied of course to the moveable transparent body.

Out of habit, for over a century, we have continued to use  $\frac{c}{\mu'}$ . We were misled because the velocity  $c$  of light is so huge a difference introduced by a mechanical speed  $\varpi$  is absolutely negligible in almost all optical experiments even the most accurate. But what is perfectly acceptable in general is not for the very special experiment to measure *the effect of velocity*  $\varpi$ . In this case it certainly makes sense to consider this speed wherever it exists physically. My calculation then shows that the experimental result is true: *there is no drag*.

This result is of high importance for the theory. The theory that believes it provides "a theoretical deduction of the coefficient of drag" in the

<sup>(1)</sup> *Comptes Rendus*, vol. 175, 1922, p. 574

sense of a "dragging of light waves by ponderable matter" (<sup>1</sup>), and admits that the coefficient "cannot be deduced except only by means of special assumptions" (<sup>2</sup>), and the theory that takes the Fizeau experiment as

*experimentum crucis* in his favor, especially for the formula  $\frac{V+\varpi}{1+\frac{V\varpi}{c^2}}$

it gives for the composition speeds (Einstein), *these theories are therefore inherently wrong* based on my results. Instead of being based on a result of experiment, *they derive from a misinterpretation of the experiment.*

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(<sup>1</sup>) LORENTZ, *Arch. néerlandaises*, vol. 25.

(<sup>2</sup>) LORENTZ, *Elektrische und optische Erscheinungen*.