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Fresnel Dragging Explained

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The Fresnel Dragging Coefficient required to explain the result of the Fizeau experiment can be easily explained by using the principles of Energy Field Theory set out in my earlier papers (see references at the end of this paper).

The key to understanding why the effect occurs lies in the fact that each of the particles of water is itself a standing wave comprised of energy waves that are moving through the background energy field (which acts as a medium) comprised of the sum of all of the particles in the causally connected Universe.

Armed with this understanding, we can now analyse the experiment successfully:

When the water is flowing down the tubes in the experiment, the wave of disturbance due to the light wave propagating in the water is carried along with the water at the water's full velocity, as one would expect in a classical sense. However, as the water particles themselves are comprised of waves that are flowing through the background energy field of space (which is not moving with the water flow), any wave disturbances within the water are communicated upstream at a faster rate than in the downstream direction. Thus, the forces between the water particles that cause the light wave to propagate through the water will cause the light to travel upstream at a speed faster than c_n (the normal speed of light in the water when it is stationary), and at a speed that is slower than c_n in the downstream direction.

To prove that this approach works, see the following maths.

The two light path travel times in the Fizeau experiment are:

$$t_1 = \frac{2L}{c_n - v} \quad (1) \qquad t_2 = \frac{2L}{c_n + v} \quad (2)$$

In the new analysis, we need to use the following new definitions:

$$c_{up} = \frac{c + v/n}{n} \quad (3) \qquad c_{down} = \frac{c - v/n}{n} \quad (4)$$

The reason for these definitions is that when the disturbance is travelling up/down the water stream (usually at c_n in still water), some of the distance between the molecules of water has already been travelled by the next molecule that is about to receive the propagating signal.

If the propagating force between the water molecules were travelling at c_n, then in one unit of time, the next water molecule to receive the signal would have travelled a distance of v to meet the incoming signal. However, the propagating force is travelling between the water molecules at a speed of c (through the background energy field of space, as explained earlier) so the distance travelled by the next water molecule will be ${}^{v}\!/_{n}$. So this is the amount we must vary the c term in the definition of c_n used in equations (1) and (2). Thus we have equations (3) and (4) as shown above.

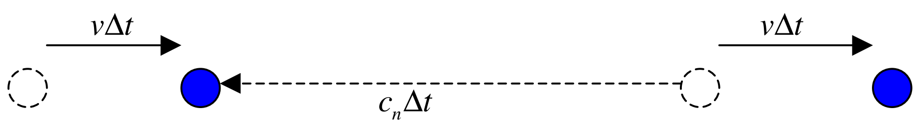

Fig 1: If the force between the molecules moved at c_n, then $v\Delta t$ would be the distance the water had moved during it's travel between molecules.

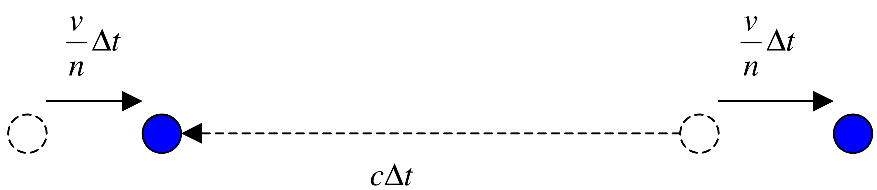

Fig 2: But the force between the molecules moves at c, so the distance the water has moved during it's travel between molecules is $\frac{v}{n}\Delta t$.

Therefore we have calculated the distance per unit time that the disturbance wave has effectively travelled ($c + {}^{v}\!/_{n}$ or $c - {}^{v}\!/_{n}$) and then apply the refractive index modification factor n to that distance, as it affects the propagation speed over that whole distance.

So equations (1) and (2) become:

$$t_1 = \frac{2L}{c_{up} - v} = \frac{2L}{\frac{c + {}^{v}\!/_{n}}{n} - v} = \frac{2L}{\frac{c}{n} - v\left(1 - \frac{1}{n^2}\right)} \qquad (5)$$

$$t_2 = \frac{2L}{c_{down} + v} = \frac{2L}{\frac{c - v/n}{n} + v} = \frac{2L}{\frac{c}{n} + v\left(1 - \frac{1}{n^2}\right)} \tag{6}$$

Making the substitution:

$$v' = v\left(1 - \frac{1}{n^2}\right) \tag{7}$$

Then equations (5) and (6), become:

$$t_1 = \frac{2L}{\frac{c}{n} + v'} \tag{8}$$

$$t_2 = \frac{2L}{\frac{c}{n} - v'} \tag{9}$$

Then to get the overall result, we combine the two times:

$$t_1 - t_2 = \frac{2L}{\frac{c}{n} - v'} - \frac{2L}{\frac{c}{n} + v'}$$

$$t_1 - t_2 = \frac{2L\left(\left(\frac{c}{n} + v'\right) - \left(\frac{c}{n} - v'\right)\right)}{\frac{c^2}{n^2} - v'^2}$$

$$t_1 - t_2 = \frac{4Lv'}{\frac{c^2}{n^2} - v'^2} \tag{10}$$

This is the same as equation (5) in my paper titled “The Fizeau Experiment” (see reference at the end of this paper).

So the total fringe shift is:

$$\delta = \frac{c\Delta t}{\lambda_0} = \frac{4cLv'}{\lambda_0\left(\frac{c^2}{n^2} - v'^2\right)} \tag{11}$$

Note: This result assumes monochromatic light is used in the experiment, as the effect of dispersion due to spreading of different component frequencies is not included here. A small correction needs to be made if not using monochromatic light.

References

"Relatively Simple? An Introduction to Energy Field Theory"
2001, Declan Traill
http://www.wbabin.net/traill/traill.pdf

Declan Traill "The Fizeau Experiment"
http://www.wbabin.net/traill/traill12.pdf