

## REVIEWS ON THE MANUSCRIPT [14]

### Reviewer 1:

In my opinion the problem is solved quite well, but there are some significant remarks:

1. **Fresnel equations:** there are no formulas of Fresnel equations in the paper.

There are also some strange phrases like: "The relevance of Fresnel's equations was also studied." (Fresnel equations describe the behavior of light when moving between media of differing refractive indices. That's quite definitely your case. What do you mean?) Consider a clarification.

"Relevance of *Fresnel's equations* was investigated by taking a photo of an image and analyzing it in a computer program." & "We can see that *Fresnel's equations* plays role for this phenomenon and..." & "For this purpose, *Fresnel's equations* were proposed in the paper"

(It should be all reformulated! The relevance cannot be investigated by taking photos and also equations themselves cannot play a role in a phenomenon).

2. It is difficult to understand how the angles are determined. Consider a clarification in the text and/or on the figures, where necessary.

3. It would be easier to understand the whole picture if the critical angle at which total reflection occurs was calculated.

4. "5 indices of refraction were determined." But there are only 4 of them on the Graph 2.

5. Please reformulate the introduction (for example, replace the second and the third paragraphs) and conclusion part (try to make like point by point).

### Reviewer 2:

The report is generally well written in good English, and is clear and concise. I do however consider that there are issues that need addressing.

Figure 4 is not reproduced well in the pdf version, and it is unclear which angles are being referred to due to the lack of 'normal' lines. These lines do appear in the Word version, but certainly in my version of Office (2010), the labels are in completely the wrong place. In addition, the angle marked  $\alpha_c$  is not the same as the angle marked  $\alpha_c$  in Figures 5a and 5b, which could be confusing. Furthermore, the critical angle at a glass/air interface is also referred to as  $\alpha_{Gc}$  elsewhere. It would seem sensible to be consistent throughout the report, i.e. by using  $\alpha_{Lc}$  for the liquid/air interface.

Equations are not generally rendered in an easily readable (or printable) format in the pdf copy.

The formula derived 'with a little trigonometry' on page 2 is interesting.

If

$$\sin \alpha_{ic} = \sqrt{n_L^2 - 1},$$

then a nonsense result is obtained if  $n_L > \sqrt{2}$ . A physical interpretation of this would have been informative.

The refractive index of glass is quoted as 1.5 in deriving  $\alpha = 41.8^\circ$ . This should read  $\alpha_{Gc} = 42^\circ$  to be consistent, although the result turns out to be irrelevant in the final conclusion.

The formula

$$\cos \alpha_o = \sqrt{n_L^2 - 1}$$

again gives a nonsense result for  $n_L > \sqrt{2}$  and it would again be nice to see this given a physical interpretation.

Once  $\alpha_o$  has been derived, it seems unnecessary to further relate  $\alpha_o$  to H, L and D.

The experiment states that 5 liquids were used, but only 4 appear on the graph.

The refractive indices and uncertainties are quoted in an inconsistent manner. As few experimental details were given, it is difficult to comment on the size of these uncertainties, which seem remarkably small.

The slope of the graph being 1.3 instead of 1.0 is a very significant discrepancy that just gets mentioned, and is not accounted for. There are no uncertainty bars on this graph.

The conclusion is satisfactory, but I am left wondering if the problem was ever fully addressed. There is a lot of work on the geometry of refraction in the vessel, and total internal refraction, but the nature of the fingerprint is given little consideration.

The depth of the ridges is given as  $10^{-4}$  m, but I don't know if this is measured or speculative. The phenomenon of optical tunnelling is used to account for areas where TIR does not occur, but this is again speculative (although very hard to do experiments on). Is the air gap really of the order of  $10^{-7}$  m, or is this again speculative?

I believe that grease and sweat on fingertips have a significant importance here, but it is not appropriate to comment on what was not presented.

### Editorial request

References: The list of references is not typeset properly. Please type the references in a way that the readers may immediately understand where and how they may look for a document. Add volumes and journal titles for the references [2, 3, 4].

What parts of the manuscript rely on or cite each of the references?