Converging through the window

Winter usually invites everybody to sit down in a comfortable armchair and enjoy the heat coming from a stove or the sun light passing through the window. The glass of the windows is commonly smooth and the light passes through it without being deviated, [1]. It suffers refraction into the glass but leaves it in the same direction as it has arrived to it. In other cases, it is also usual that windows of street-level homes had translucent glasses which allows the light passing through them but without letting see clearly what happens at the other side of the glass. They make each sun ray to leave the glass at a random direction in a similar fashion as it is shown in [2]. Other possibility is using a glass with a certain periodical shape such as a 2D-lens array [3], Figure 1a. If we look closer, the refractive index structure is revealed (zoom in Figure 1a).

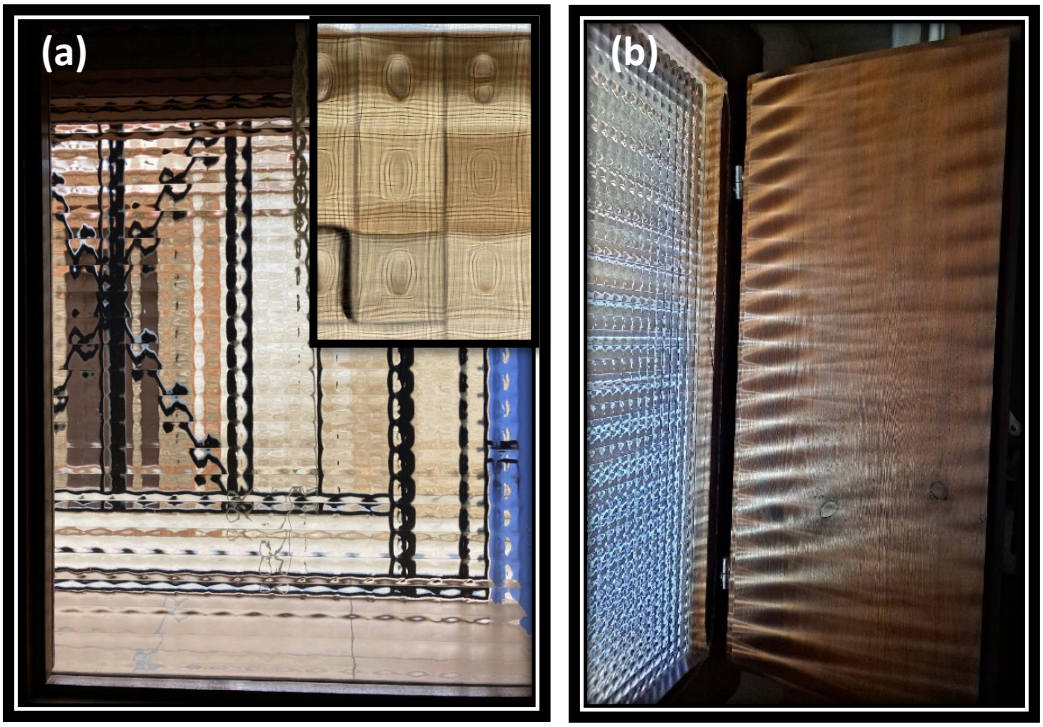

Figure 1.- (a) Image of the glass with a zoom of the glass structure and (b) multi-focusing of light through the window.

In this particular case, other effect on the sun rays is produced. For example, it is possible to observe multi-focusing of light, as it is shown in Figure 1b. It results interesting to observe how rays of sunlight coming directly from the sun, that can be considered as collimated, converge approximately to a point and propagate after that, creating areas of bright and shadows. Physics is everywhere, [4]. One only needs to observe around and ask himself what is happening there and why.

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References:

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