Abstract Submitted
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Hydrodynamic Instabilities Produced by Evaporation[1] JULIO CESAR RUBEN ROMO-CRUZ, SERGIO HERNANDEZ-ZAPATA, GERARDO RUIZ-CHAVARRIA, Facultad de Ciencias, Universidad Nacional Autonoma de Mexico — When a liquid layer (alcohol in the present work) is in an environment where its relative humidity is less than 100 percent evaporation appears. When RH is above a certain threshold the liquid is at rest. If RH decreases below this threshold the flow becomes unstable, and hydrodynamic cells develop. The aim of this work is to understand the formation of those cells and its main features. Firstly, we investigate how the cell size depends on the layer width. We also study how temperature depends on the vertical coordinate when the cells are present. An inverse temperature gradient is found, that is, the bottom of liquid layer is colder than the free surface. This shows that the intuitive idea that the cells are due to a direct temperature gradient, following a Marangoni-like process, does not work. We propose the hypothesis that the evaporation produce a pressure gradient that is responsible of the cell development. On the other hand, using a Schlieren technique we study the topography of the free surface when cells are present. Finally the alcohol vapor layer adjacent to the liquid surface is explored using scattering experiments, giving some insight on the plausibility of the hypothesis described previously.

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