**From Deformation to Stable State: Study On the Air-layer Beneath a Non-coalescence Droplet**

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**Abstract**

A droplet may float on a vibrating bath for a period of time without causing coalescence. This phenomenon is contributed by a nether air layer, which prevents separated surfaces getting into contacted. In this paper, we put forward a model to describe the supporting force in relation to properties of the air layer, and based on that we explore how the characteristics of air layer varying in a period. Furthermore, we discuss the how deformation of both the droplet and the layer would affect the stability of droplets and the drainage time, by introducing a correction coefficient. We then design some experiments to testify whether our model fits the results. In the last part of this paper we will discuss deformation in terms of tao, and meanwhile present a method using a beam of paralleled nature light, to approximately calculate the square of a vibrating liquid surface.

*Keyword: non-coalescence droplets, air layer, resonance, deformation*

This physics research began with an accidental discovery by me and Yan. When flipping the bottle of water, we found that droplets that were bounced up stayed on the liquid surface for a little time before eventually merging into it. Our curiosity for this special phenomenon motivated us to explore the mechanism behind it.

The research consists of three phases: Modeling, Experimentation, and paper writing. During the modeling phase, I was mainly responsible for searching related research papers and deducing mathematical equations. For example, by using differential equation, I was able to analyze the force condition of fluids. In the experimentation phase, I was the one who design the specific experiment that measures the surface tension of different liquids. And in the final paper writing stage, I was in charge of the constructing graphics for our data and equations.