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*The Leidenfrost Phenomenon: A Wave Mode Fluctuation Investigation*

The purpose of this project is to investigate the relationship between the mass of a water drop and the wave fluctuation mode (number); the temperature of the hot plate and the fluctuation frequency of the water drop; and to derive a mathematical relationship among mass and the fluctuation frequency of the water drop. The researcher hypothesizes the following: 1) The number of wave fluctuation is dependent upon the mass of the water drop placed on the hot surface. 2) Fluctuation of greater numbers can only exist at higher temperatures.

A series of experiments were performed with distilled water to determine the relationship between wave fluctuation mode observed and the mass of the fluctuating water drop. A stainless steel plate was heated and 1000. mL or more of distilled water was placed on the plate, allowed to fluctuate and then recaptured and massed to determine the relationship. Temperature of the stainless steel was held constant during this experimentation ( $390^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ). In a separate experiment correlation between the temperature of the stainless steel plate and number of wave fluctuations for the water drops were observed.

A theoretical average mass of 1.29 grams, based on equation derived by author, should be predicted for a water drop with a six-wave mode. An experimental average mass of 1.23 grams was observed giving a percentage error of 4.65%.

The researcher concluded that there is a relationship between the mass of the water drop and the number of wave fluctuations possible.