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Investigation of Wave Phenomenon

Due to the complex nature of waves, theoretical results often require validation through observation. The purpose of this project was to note characteristics of water waves as a function of frequency on a toroidal shape. The characteristics of waves would then be defined by the number of nodes present at each driven frequency and the length of each wave. To contain the water in a toroidal shape, ski wax (a hydrophobic material) was used to outline the region. The Petri dish was then placed on the top of a speaker to effectively capture the vibrations of every frequency. An angled light dramatically highlighted the waves and multiple pictures were taken at each recorded frequency to obtain a proper node count. Frequency was increased by two hertz until the waves were no longer visible at 70 hertz. Data was collected by taking the average node count of the multiple pictures and calculating the wave length. The data revealed that each frequency had different patterns of waves. Bands of waves were noticed to have taken an effect on the number of nodes present. Within a constant number of bands, the node count would increase as frequency increased, but when a new band developed the node count would suddenly drop. This project demonstrates that standing waves can be formed in a bound fluid as a function of the driven frequency. This understanding could find application in obtaining zones of concentrated mass in plasma in the semi-toroidal magnetic confinement of a nuclear fusion reactor.