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## **A study of pendulum bob oscillations of an undamped simple pendulum with large-angle motion**

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An undamped simple pendulum motion was studied for large-angle oscillations. The motion was captured using video-capturing techniques, and the trajectory of the pendulum bob was also determined. Using Tracker and Kinovea Video Analysis software, the experimental time periods of oscillations of a simple pendulum with various angular displacements were determined. The analytic approximation formula for the solution to the differential equation representing the oscillations of a simple pendulum at large angles, which was previously reported, was used in this study to obtain analytical solutions. A comparison between theoretical and experimental values was carried out. The first three terms of the approximation formula for the time period were used to determine theoretical values. The findings show that both measures are statistically related, but this relationship is far from ideal in theory. This study also shows that this approach is feasible and interactive for analyzing the motion of a simple pendulum.

**Keywords:** Simple pendulum, Time period, Large angle oscillations

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