

Design and Development of Equipment for experimental using free fall motion by laser sensor timer photo gate of low-cost

This research deals with the design and construction of experimental apparatus to determine the acceleration due to gravity on Earth by using free fall motion. The apparatus is made of a stainless steel pipe which is commercially sold. The stopwatch is used to measure times with resolution of 0.05 seconds. Falling objects induces signals through magnetic induction. The type GaAs semiconductor laser voltage of 4.5 volts is used as a light source for the photo gate. The control can be done by touch switches to stop with a magnetic force from a permanent magnet with the spring after the object falls. The objects can travel for 1 to 2 meters. The experimentally obtained values of gravitational acceleration (g) were compared to the values obtained from the National institute of metrology (Thailand). The measured value of g is 9.78297 m/s² at Bangkok that the error was 2.20 percent. The result from the students after using the apparatus showed that the new apparatus can be used to measure g with an error of 1.28 percent.

Keyword: free fall, Gravitational acceleration, the type GaAs semiconductor laser

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