

ZMATH 2016e.00932

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Wagging conical pendulums and visualization in mechanics.

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Summary: Students often find mechanics a difficult area to grasp. This paper describes an equation of motion for a wagging conical pendulum. A wide range of pendulum dynamics can be simulated with this model. The equation of motion is embedded in a graphical user interface (GUI) for its numerical solution in MATLAB. This allows a student's focus to be on the influence of different parameters on the pendulums dynamics. The simulation tool can be used as a dynamics demonstrator in a lecture or as an educational tool driven by the imagination of the student. By way of demonstration, the simulation tool has been applied to two damped pendulums and an inverted damped pendulum. The model has also been used to simulate resonance and has shown that there is a wide range of behaviour possible depending on the type of forcing applied. Finally, a forced conical pendulum as a system for harnessing wave energy is considered.

Classification: M50 U70

Keywords: mechanics; resonance; damped pendulums; inverted pendulums; GUI; animation; wind energy harvesting

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