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Modeling real-life pendula JEREMY REDD, ALEXANDER PANIN, Utah Valley University — Since being introduced into the theory of damped oscillations, we use linear differential equation to model various oscillating systems including a pendulum. But real world pendula are not linear systems (even when the amplitude of oscillations is small). For example, air drag on a real size pendulum (from a few cm to a few meters in length) is quadratic rather than linear (by velocity), and a friction in a pivot point is often dominated by a static (rather than velocity-dependant) term. As a consequence, the decay patterns of real pendula are usually different than a classic exponent. This can be often seen when students perform pendulum lab using computer interface. By including air drag, air viscosity and static friction into the equation of oscillations we obtained very realistic model of real pendula. A comparison of the results of such model with experiments are discussed in the presentation.

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