1135-C5-425 **James Walsh*** (jawalsh@oberlin.edu). *What happens when you periodically force a nonlinear oscillator?*

Periodic forcing of a harmonic oscillator is a fundamental topic in the sophomore-level ODEs course. Interesting and important behaviors such as beats and resonance are known to occur in this setting. Due to the linear nature of the spring's restoring force, however, more intricate behaviors such as chaotic trajectories cannot occur. What if the oscillator is nonlinear? I will present a simple periodically force nonlinear oscillator model designed by an undergraduate at Oberlin. As an analysis of the model in the presence of damping appeared previously in the *CODEE Journal*, I will focus on the undamped case. The use of *Mathematica* yields great insight into model behavior, illustrating the coexistence of stable and chaotic motions for certain parameter regimes, as well as the persistence of invariant curves and quasiperiodic motion for the associated Poincaré map for small amplitude forcing. The model would fit nicely in an applied mathematics or modeling course in which the study of ODEs incorporates a dynamical systems perspective. (Received September 01, 2017)