

**Meeting:** 1003, Atlanta, Georgia, MAA CP J1, MAA Session on Projects and Demonstrations that Enhance a Differential Equations Course, I

1003-J1-465      **Tanya L. Leise\*** (tleise@amherst.edu), Math & CS Dept, CM 2239, Amherst College, P.O. Box 5000, Amherst, MA 01002-5000. *Phase Transitions in Coupled Nonlinear Oscillators*. Preliminary report.

The modeling exercise described here involves a physical phenomenon that is easily reproduced in the classroom without any equipment and that can be modeled using differential equations that are amenable to both analysis and numerical computations. This exercise gives students experience in analyzing limit cycles and phase transitions, topics not typically covered in a differential equations course. We examine a synchronization phenomenon that occurs as two fingers move at increasing frequency, which we model via a system of coupled hybrid nonlinear oscillators (a combination of Van der Pol and Rayleigh DEs). With the aid of a CAS we find and analyze limit cycles and their stability, as well as experimenting with numerical simulations. (Received October 05, 2004)