

1154-37-2754

**Lauren Lazarus\*** ([lauren.lazarus@trincoll.edu](mailto:lauren.lazarus@trincoll.edu)). *Comparison and machine classification of limit cycles from ODE and delayed oscillator models*. Preliminary report.

Many nonlinear systems exhibit oscillatory behavior in the form of limit cycles, including the common van der Pol equation and its variants. In this talk, I will discuss differences between the limit cycles governed by various oscillator models, and how the models' outputs may be classified through those differences. After standardizing the frequencies, phases, and amplitudes of the cycles by adjusting relevant model parameters, we find that distinctions remain between the shapes of the limit cycles. Using these features, can we train a machine learning method to classify output data from an unknown oscillator?

While many oscillators (including the van der Pol model above) are governed by ordinary differential equations of at least second order, limit cycles can also be caused by system delay. The comparison of limit cycles in this talk will therefore include multiple variants of a first-order delay limit cycle oscillator as well. (Received September 17, 2019)