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**JASON BRAMBURGER**, University of Ottawa

*Steady-state/Hopf interactions in the van der Pol oscillator with delayed feedback*

In this talk we consider the traditional Van der Pol Oscillator with a forcing dependent on a delay in feedback. The delay is taken to be a nonlinear function of both position and velocity which gives rise to many different types of bifurcations. In particular, we study the Zero-Hopf bifurcation that takes place at certain parameter values using methods of centre manifold reduction of DDEs and normal form theory. We present numerical simulations that have been accurately predicted by the phase portraits in the Zero-Hopf bifurcation to confirm our numerical results and provide a physical understanding of the oscillator with the delay in feedback.