1038-92-27 **Andrea K Barreiro*** (abarreir@uiuc.edu), Department of Mathematics, University of Illinois at Urbana-Champaign, 1409 W. Green St., Urbana, IL 61801, and **Jared C Bronski** and **Thomas J Anastasio**. *Bifurcation theory for a model of the oculomotor neural integrator.*

In this paper we consider a linear model for the oculomotor integrator originally proposed by Anastasio and Gad (Journal of Computational Neuroscience, 2007). We are able to use the fact that the system is a finite rank (rank one or two) perturbation of a symmetric, negative definite system, together with a simple idea of classical differential geometry (the envelope of a family of curves) to completely analyze the bifurcations in this model. This analysis gives considerable insight into some observations made in that work. Specifically, we explain how neurons in a brain region known as the cerebellum, which are connected to the neurons that compose the integrator, can sensitively yet independently regulate both the static and dynamic properties of the integrator. Additionally we find that the model has an interesting structural instability. In biologically plausible operating regimes the model lies near a "triple" point, where the regions in which the dominant eigenvalue is real and negative, real and positive, and complex all meet. The model provides a new perspective on the possible etiology of a hereditary eye movement disorder known as congenital nystagmus. (Received December 20, 2007)