

1020-93-51

German A Enciso* (genciso@mbi.osu.edu), 231 W18th Ave, MBI, Columbus, OH 43210. *On Transcriptional Delays in Cyclic Biochemical Networks.*

Recent work in synthetic biology by Elowitz and Leibler and many others has stressed the importance of self-inhibitory gene expression networks in the appearance of oscillations. It has been pointed out by Lewis and Monk that delays in gene transcription and protein translation might have an essential role in tuning the period of the oscillation, as well as determining whether a persistent oscillation is at all present in the system. Examples of this idea have been given in the context of NF-kB and p53 oscillations, as well as the Hes1 gene involved in somitogenesis.

Two complementary analyses of a cyclic negative feedback system with delay are considered in this talk. The first analysis applies the work by Sontag, Angeli, Enciso and others regarding monotone control systems under negative feedback, and it implies the global attractiveness towards an equilibrium for arbitrary delays. The second one concerns the existence of a Hopf bifurcation on the delay parameter, and it implies the existence of nonconstant periodic solutions for special delay values. A key idea is the use of the Schwarzian derivative, and its application for the study of Michaelis-Menten and Hill nonlinearities. (Received August 07, 2006)