

1077-37-1549

**Hassan M Fathallah-Shaykh\*** (hfathall@uab.edu), FOT 1020, 1530 3RD Ave S, Birmingham, AL 35294-3410, and **Abraham Freiji** (afreiji@uab.edu), FOT 1020, 1530 3RD Ave S, Birmingham, AL 35294-3410. *Global Asymptotic Stability in a Model of Biological Networks.*

Global asymptotic stability (GAS) is a key feature of the dynamical behavior of biological networks. We construct a suitable Lyapunov function for a system of ODEs, related to the Lotka-Volterra model, which models molecular networks and derive a sufficient condition for GAS. In particular, an  $n$ -dimensional system with interaction matrix  $\mathbf{A}$  and a unique interior equilibrium is GAS if there exists a diagonal positive matrix  $\mathbf{D}$  such that  $\mathbf{DA} + \mathbf{A}^T\mathbf{D}$  is negative definite. This theorem is applied to derive conditions for GAS of negative feedback loop chains with or without feedback. The results are illustrated by numerical examples. (Received September 20, 2011)