

Meeting: 1002, Pittsburgh, Pennsylvania, SS 13A, Special Session on Mathematical Biology

1002-37-219 **David Swigon*** (swigon@pitt.edu), Department of Mathematics, University of Pittsburgh, 301 Thackeray Hall, Pittsburgh, PA 15260. *Equilibrium states of chemical reaction networks*. Preliminary report.

The concentration of chemical species in a well-stirred reactor obeys approximately a system of first-order nonlinear ordinary differential equations with rate functions given by the principle of mass-action kinetics. Presented will be necessary and sufficient conditions for the existence of equilibrium points in such a system, which complement the results obtained by Horn, Jackson and Feinberg and clarify the relation between chemical network topology and its dynamics. In particular, it will be shown that if the network has appropriate topological properties the existence of an equilibrium point is guaranteed regardless of the value of rate constants in the equation. Applications to genetic network dynamics will be discussed. (Received September 14, 2004)