1048-34-50 **Murat Arcak*** (arcak@eecs.berkeley.edu), 569 Cory Hall, University of California, Berkeley, CA 94720, and **Eduardo Sontag** (sontag@math.rutgers.edu), Rutgers, the State University of New Jersey, Hill Center, Piscataway, NJ 08854. *Passivity-Based Stability Analysis and Applications to Biochemical Reaction Networks.*

The passivity concept - an abstraction of energy conservation and dissipation in physical systems - has been instrumental in feedback control theory and led to breakthroughs in nonlinear and adaptive control design. In this talk we discuss the use of passivity as a stability test for classes of biochemical reaction networks. The main result determines global asymptotic stability of the network from the diagonal stability of a dissipativity matrix which incorporates information about the passivity properties of the subsystems, the interconnection structure of the network, and the signs of the feedback terms. This stability test encompasses the well-known "secant criterion" for cyclic networks and extends it to general interconnection structures represented by graphs. The results are illustrated on MAPK cascade models and on branched interconnection structures motivated by metabolic networks. (Received January 13, 2009)