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G Craciun, J W Helton and **R J Williams***, Dept of Mathematics, UCSD, 9500 Gilman Drive, La Jolla, CA 92093-0112. *Homotopy Methods for Counting Reaction Network Equilibria.*

Dynamical system models of complex biochemical reaction networks are usually high-dimensional, nonlinear, and contain many unknown parameters. In some cases the reaction network structure dictates that positive equilibria must be unique for all values of the parameters in the model. In other cases multiple equilibria exist if and only if special relationships between these parameters are satisfied. We describe methods based on homotopy invariance of degree which allow us to determine the number of equilibria for complex biochemical reaction networks and how this number depends on parameters in the model. (Received January 11, 2009)