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Suzanne Galayda* (sgalayda@nmsu.edu) and **Ernest Barany**. *Effect of the Diffusion Coefficient on Noise Sensitivity in the Stochastic Chemostat.*

The chemostat (or continuous stirred tank reactor) is used in the investigation of microbial interactions under nutrient limitation. In this talk we discuss the derivation of a stochastic form of the corresponding mathematical model. We use two methods to derive our model. In the first we perturb one or both of the equation parameters by noise, resulting in three possible forms of the diffusion coefficient for the stochastic chemostat model. In the second we assume the existence of an underlying Markov process in the system and derive the drift and diffusion coefficients from the transition probabilities. By assuming either dependence or independence of the system parameters, we derive two additional forms for the diffusion coefficient. The effect of the form of the diffusion coefficient on the sensitivity of the system to noise is determined by comparing models numerically. Derivation methods are contrasted and the physical interpretation of each method is discussed. (Received September 22, 2009)