Stochasticity in NF-κB Regulation
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The nuclear factor κB (NF-κB) family of transcription factors is important in the expression of many genes, including several involved in the immune response. A model was recently proposed that approximates this pathway using ordinary differential equations. The basic processes included in that model are those of NF-κB and its activator, IκB (IKK), as well as its inhibitors, A20 and IκBα. Because this model uses ordinary differential equations, there is no inclusion of noise and fluctuations which often have great effects on biological systems. We converted the ordinary differential equations into stochastic differential equations, allowing us to study the possible implications of noise on the deterministic model by analyzing the qualitative differences in the dynamics of the system.