1065-92-41 **Yan Hao*** (yxhaox@wm.edu), The College of William and Mary, Applied Science Dept., Williamsburg, VA 23187, and **Gregory D Smith** (greg@wm.edu), POBox 8795, Applied Science Dept., Williamsburg, VA 23187. *A Langevin description of the stochastic dynamics of calcium release sites composed of multiple intracellular channels.* Preliminary report.

Compositionally defined Markov chain models have been used to study the relationship between single channel gating of intracellular calcium (Ca2+) channels and the stochastic dynamics of Ca2+ "puffs" and "sparks," intracellular Ca2+ release events that arise from the cooperative activity of clusters of Ca2+ channels. In such models, the transition probabilities of individual channels depend on the local Ca2+ concentration and thus the state of the other channels. Consequently, Markov chain models of Ca2+ release sites often possess intractably large state spaces that impede computational analysis. To overcome this difficulty, we derived a general Langevin formulation for the stochastic dynamics of Ca2+ release sites complosed of a large number of intracellular Ca2+ channels. We validate this Langevin formulation by comparison to Markov chain simulations and perform benchmark simulations that demonstrate its computational efficiency for single channel models with 2 or more states and release sites composed of 20 to 80 channels. This project is joint work with Gregory D. Smith. (Received August 11, 2010)