1035-60-908 **Di Liu*** (richardl@math.msu.edu), A201 Wells Hall, East Lansing, MI 48824. *Nested Stochastic Simulation Algorithms for Chemical Kinetic Systems with Multiple Time Scales.*

We present an efficient numerical algorithm for simulating chemical kinetic systems with multiple time scales. This algorithm is an improvement of the traditional stochastic simulation algorithm (SSA), also known as Gillespie's algorithm. It is in the form of a nested SSA and uses an outer SSA to simulate the slow reactions with rates computed from realizations of inner SSAs that simulate the fast reactions. The algorithm itself is quite general and seamless, and it amounts to a small modification of the original SSA. Our analysis of such multi-scale chemical kinetic systems allows us to identify the slow variables in the system, derive effective dynamics on the slow time scale, and provide error estimates for the nested SSA. Efficiency of the nested SSA is discussed using these error estimates, and illustrated through several numerical examples. (Received September 17, 2007)