Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

An iterative action minimizing method for computing optimal paths in stochastic dynamical systems BRANDON LINDLEY, IRA SCHWARTZ, Naval Research Laboratory — We present a numerical method for computing optimal transition pathways and transition rates in systems of stochastic differential equations (SDEs). In particular, we compute the most probable transition path of stochastic equations by minimizing the effective action in a corresponding deterministic Hamiltonian system. The numerical method presented here involves using an iterative scheme for solving a two-point boundary value problem for the Hamiltonian system. We validate our method by applying it to both continuous stochastic systems, such as nonlinear oscillators governed by the Duffing equation, and finite discrete systems, such as epidemic problems, which are governed by a set of master equations. Furthermore, we demonstrate that this method is capable of dealing with stochastic systems of delay differential equations.

Brandon Lindley
Naval Research Laboratory

Date submitted: 09 Nov 2012 Electronic form version 1.4