Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Accurate fluctuation prediction in epidemics using stochastic model reduction[1] ERIC FORGOSTON, IRA SCHWARTZ, U.S. Naval Research Laboratory — We consider a large-scale dynamical system with stochastic forcing and outline a general theory to reduce the dimension of the stochastic system. The general procedure employs a stochastic normal form coordinate transform and allows one to analytically derive both the stochastic center manifold and the reduced set of stochastic evolution equations. The transformation correctly projects both the dynamics and the noise onto the center manifold. We have applied the theory to a stochastic Susceptible-Exposed-Infected-Recovered (SEIR) epidemiological model. When compared with the original model, the reduced dynamical system accurately predicts fluctuations of disease outbreaks both in amplitude and phase.

[1]Research supported by the Office of Naval Research and the Army Research Office.

Eric Forgoston
U.S. Naval Research Laboratory

Date submitted: 20 Nov 2008 Electronic form version 1.4