Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Kalman meets neuron - the intersection of control theory and neuroscience[1] STEVEN SCHIFF, Penn State University — Since the 1950s, we have developed mature theories of modern control theory and computational neuroscience with almost no interaction between these disciplines. With the advent of computationally efficient nonlinear Kalman filtering techniques, along with improved neuroscience models which provide increasingly accurate reconstruction of dynamics in a variety of important normal and disease states in the brain, the prospects for a synergistic interaction between these fields are now strong. I will show recent examples of the use of nonlinear control theory for the assimilation and control of single neuron dynamics, a novel framework for dynamic clamp, the modulation of oscillatory wave dynamics in brain cortex, a control framework for Parkinsonian dynamics and seizures, and the use of optimized parameter model networks to assimilate complex network data.

[1]Supported by NIH K02MH01493, R01MH50006.

Steven Schiff
Penn State University

Date submitted: 19 Nov 2008 Electronic form version 1.4