Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Time-Shifted Synchronization of Chaotic Oscillator Chains without Explicit Coupling Delays JONATHAN BLAKELY, MARK STAHL, NED CORRON, US Army RDECOM — It has recently been reported that time-shifted synchronization (i.e., lag or anticipation) of chaotic oscillators can result from forms of coupling that do not contain explicit delay terms. Identical time-shifted synchronization is not a solution in these systems so the dynamics are a form of generalized synchronization where trajectories are similar but not exactly identical. Here we examine chains of uni-directionally coupled oscillators in which time-shifted synchronization occurs without delays in the coupling. We observe the distortion of the waveforms of the response oscillators located far from the drive oscillator. Under weak coupling, we see much less distortion occurs over chains with significant total time shift than predicted by a recently introduced theoretical estimate. Under stronger coupling, we find better agreement with the theoretical prediction and, despite sometimes severe attenuation, generalized synchronization is maintained over long chain lengths. We report results from numerical models as well as from an experimental system of electronic circuits. Such oscillator chains may prove useful in applications requiring a variable delay such as chaotic radar or beam forming.

Jonathan Blakely
US Army RDECOM

Date submitted: 20 Nov 2008 Electronic form version 1.4