Chaos computing in hybrid digital-analog systems\textsuperscript{1} VIVEK KOHAR, BEHNAM KIA, North Carolina State University, Raleigh, NC 27695-8202, JOHN F. LINDNER, The College of Wooster, Wooster, OH 44691, WILLIAM L. DITTO, North Carolina State University, Raleigh, NC 27695-8202 — Nonlinear dynamical systems, especially when operating in chaotic regime, are very sensitive to noise and the deviations due to noise restrict the exploitation of the large number of dynamical behaviors contained in these systems. We discuss the super-stability of some initial conditions of nonlinear dynamical systems \textsuperscript{2} and how such initial conditions can be utilized in chaos computing to implement all Boolean functions in hybrid digital-analog systems \textsuperscript{3} consisting of digital AND gates and a 3–transistor analog circuit. We further discuss the super-linear scaling of noise robustness of these super-stable initial conditions when a number of identical nonlinear dynamical systems are coupled together in various network topologies \textsuperscript{4}.

\textsuperscript{1}We gratefully acknowledge support from the North Carolina State University (NCSU) grant 201584-70677 and the Office of Naval Research STTR grant N00014-14-C-0033.


\textsuperscript{3}V. Kohar, B. Kia, J. Lindner, W. Ditto, (submitted).


Vivek Kohar
North Carolina State University, Raleigh, NC 27695-8202

Date submitted: 10 Nov 2016

Electronic form version 1.4