Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Structure-based control of complex networks with nonlinear dynamics[1] JORGE G. T. ZANUDO, GANG YANG, REKA ALBERT, The Pennsylvania State University — What can we learn about controlling a system solely from its underlying network structure? Here we use a framework for control of networks governed by a broad class of nonlinear dynamics that includes the major dynamic models of biological, technological, and social processes. This feedback-based framework provides realizable node overrides that steer a system towards any of its natural long term dynamic behaviors, regardless of the dynamic details and system parameters. We use this framework on several real networks, identify the topological characteristics that underlie the predicted node overrides, and compare its predictions to those of classical structural control theory. Finally, we demonstrate this framework's applicability in dynamic models of gene regulatory networks and identify nodes whose override is necessary for control in the general case, but not in specific model instances.

[1]This work was supported by NSF grants PHY 1205840 and IIS 1160995. JGTZ is a recipient of a Stand Up To Cancer - The V Foundation Convergence Scholar Award.

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Date submitted: 11 Nov 2016 Electronic form version 1.4