Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Hybrid dynamics in delay-coupled swarms with "mothership" networks[1] JASON HINDES, IRA SCHWARTZ, U.S. Naval Research Laboratory — Swarming behavior continues to be a subject of immense interest because of its centrality in many naturally occurring systems in biology and physics. Moreover, the development of autonomous mobile agents that can mimic the behavior of swarms and can be engineered to perform complex tasks without constant intervention is a very active field of practical research. Here we examine the effects on delay-coupled swarm pattern formation from the inclusion of a small fraction of highly connected nodes, "motherships", in the swarm interaction network. We find a variety of new behaviors and bifurcations, including new hybrid motions of previously analyzed patterns. Both numerical and analytic techniques are used to classify the dynamics and construct the phase diagram. The implications for swarm control and robustness from topological heterogeneity are also discussed.

[1]This research was funded by the office of Naval Research (ONR), and was performed while JH held a National Research Council Research Associateship Award

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Date submitted: 03 Nov 2015 Electronic form version 1.4