Abstract Submitted
for the CAL13 Meeting of
The American Physical Society

Escaping from Swarms KATHERINE COPENHAGEN, DAVID QUINT, AJAY GOPINATHAN, UC Merced — Swarming behavior extends across multiple length scales in biology ranging from bacteria to whales. Swarms are affected differently by erratic, dissenting behavior, sometimes a swarm will follow an agent which changes directions, such as a school of fish when they are done feeding, while other times the swarm lets the individual leave the group while the swarm continues on its way, like a few birds leaving the flock to land in a tree. This research investigates the different universal swarm characteristics that can lead to these different kinds of behaviors. We model flocks with a finite number of agents utilizing a velocity alignment interaction and a Lennard-Jones potential, which provides both cohesive and repulsive interactions between neighboring agents. In the swarming regime of our model, an agent is selected at random to "escape" the flock, by choosing a particular direction to travel in, and no longer align with it's neighbors. We found that close to the swarming transition the escapee was unable to escape, while deeper in the swarming regime the swarm was more stable and the particle was able to escape with little effect on the rest of the swarm. Our research sheds light on the varied responses of swarms to internal dissent and suggests optimal strategies to escape o

Katherine Copenhagen
UC Merced

Date submitted: 05 Oct 2013 Electronic form version 1.4