

1116-VC-2741 **Sebastien Motsch, Alexander Reamy*** (areamy@hargray.com), **Ryan Theisen** and **Matt Stokes**. *A Mathematical Description of Flocking and Swarming Behaviors*.

We derive a model describing the formation and evolution of a flock, accounting for three types of behavior: attraction, repulsion, and alignment. "Flocking" is said to occur if the distance between particles is bounded and all particles move in the same direction; we prove that both conditions are satisfied when attraction is sufficiently strong. This is an original result that expands upon the existing Cucker-Smale model. In cases where flocking occurs, we also investigate the structure of the flock. We have identified a criterion that determines whether the flock is stable (meaning particles are evenly spread) or catastrophic (meaning particles form a ring-like shape). (Received September 22, 2015)