1147-93-883 **Zhuoyuan Song*** (zsong@hawaii.edu), 2540 Dole Street H302, Honolulu, HI 96822. *Multi-robot swarming through fluid abstraction.*

The recent advance in the modeling and control of multi-robot systems, especially mobile robot swarms or flocks, have enabled several real-world systems with practical implications. However, existing approaches often fell short of providing a means for systemic performance analysis and prediction. To this end, a multi-robot swarming approach has been proposed based on fluid abstraction to embed a natural description of the macroscopic swarm dynamics into a distributed control scheme. Robot swarms are approximately modeled as fluids by treating each agent as a "particle" of the smoothed particle hydrodynamics (SPH) approach. It can be shown that inter-agent collisions, obstacle avoidance, flocking, and flock guidance can be achieved in an elegant fashion. Nondimensional analysis can be applied to the governing equation of the swarm dynamics (*i.e.* discrete Navier Stokes) to reveal the mapping between flock control properties (*e.g.* velocity consensus) and important dimensionless quantity in fluid mechanics (*e.g.* Reynolds number). This multi-robot modeling and control scheme has unique advantages for mobile robots navigating within fluid mediums such as strong ocean currents and hurricanes. (Received January 29, 2019)