1106-60-1673 **Quan Yuan***, 656 W Kirby FAB 1250, Detroit, MI 48202, and **G Yin**. *Particle Swarm Optimization: A Stochastic Approximation Approach.*

Recently, much progress has been made on particle swarm optimization (PSO). A number of works have been devoted to analyzing the convergence of the underlying algorithms. Nevertheless, in most cases, rather simplified hypotheses are used. Moreover, up to now, not much is known regarding the convergence rates of particle swarm. We consider a general form of PSO algorithms, and analyze asymptotic properties of the algorithms using stochastic approximation methods. We introduce four coefficients and rewrite the PSO procedure as a stochastic approximation type iterative algorithm. Then we analyze its convergence using weak convergence method. It is proved that a suitably scaled sequence of swarms converge to the solution of an ordinary differential equation. We also establish certain stability results. Moreover, convergence rates are ascertained by using weak convergence method. A centered and scaled sequence of the estimation errors is shown to have a diffusion limit. (Received September 14, 2014)