Distribution dependent SDEs for Landau type equations

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Abstract. The distribution dependent stochastic differential equations (DDSDEs) describe stochastic systems whose evolution is determined by both the microcosmic site and the macrocosmic distribution of the particle. The density function associated with a DDSDE solves a nonlinear PDE. Due to the distribution dependence, some standard techniques developed for SDEs do not apply. By iterating in distributions, a strong solution is constructed using SDEs with control. The distribution of solutions is identified with a nonlinear semigroup for probability measures. The exponential contraction as well as Harnack inequalities and applications are investigated.