

## Abstract

Recently, Hairer et al. (2015) showed that there exist stochastic differential equations (SDEs) with infinitely often differentiable and globally bounded coefficient functions whose solutions fail to be locally Lipschitz continuous in the strong  $L^p$ -sense with respect to the initial value for every  $p \in (0, \infty]$ . In this article we provide conditions on the coefficient functions of the SDE and on  $p \in (0, \infty]$  that are sufficient for local Lipschitz continuity in the strong  $L^p$ -sense with respect to the initial value and we establish explicit estimates for the local Lipschitz continuity constants. In particular, we prove local Lipschitz continuity in the initial value for several nonlinear stochastic ordinary and stochastic partial differential equations in the literature such as the stochastic van der Pol oscillator, Brownian dynamics, the Cox-Ingersoll-Ross processes and the Cahn-Hilliard-Cook equation. As an application of our estimates, we obtain strong completeness for several nonlinear SDEs.