EULER'S APPROXIMATIONS OF SOLUTIONS OF REFLECTING SDES WITH DISCONTINUOUS COEFFICIENTS

ALINA SEMRAU-GIŁKA

Let D be either a convex domain in $\mathbb{R}^d$ or a domain satisfying the conditions (A) and (B) considered by Lions and Sznitman [1]. The object of investigation are solutions of d-dimensional stochastic differential equations (SDEs) on a domain D with reflecting boundary condition of the form

$$X_t = X_0 + \int_0^t \sigma(X_s)\, dW_s + \int_0^t b(X_s)\, ds + K_t, \qquad t \in \mathbb{R}^+. \tag{1}$$

Here $X_0 = x_0 \in \overline{D} = D \cup \partial D$, X is a reflecting process on $\overline{D}$, K is a bounded variation process with variation $|K|$ increasing only when $X_t \in \partial D$, W is a d-dimensional standard Wiener process and $\sigma : \overline{D} \longrightarrow \mathbb{R}^d \otimes \mathbb{R}^d$, $b : \overline{D} \longrightarrow \mathbb{R}^d$ are measurable functions.

This presentation will be devoted to show convergence in law as well as in L^p for the Euler and Euler-Peano schemes for SDEs (1). The coefficients are measurable, continuous almost everywhere with respect to the Lebesgue measure and the diffusion coefficient may degenerate on some subsets of the domain. The proofs of theorems are based on some new generalized inequalities of Krylov's type for stochastic integrals.

These results strengthen and extend these given in the papers [2],[3]. First, the assumption of uniform ellipticity of $\sigma\sigma^*$ is considerably weaken, and secondly, theorems for D satisfying the conditions (A) and (B) are given.

Joint work with Katarzyna Borkowska.

References

[1] Lions P.L., Sznitman A.S. (1984) Stochastic differential equations with reflecting boundary conditions.
[2] Semrau, A. (2007) Euler's approximations of weak solutions of reflecting SDEs with discontinuous coefficients.
[3] Semrau, A. (2009) Discrete approximations of strong solutions of reflecting SDEs with discontinuous coefficients.