

Erratum: Small Random Perturbations of Dynamical Systems and Applications to Parabolic Equations, Vol. 24 (1974), 533–553

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Professor Steve Orey has kindly submitted to me the following corrections in the statements and proofs of Theorems 2.1, 3.1.

In the proof of (2.11) there is a mistake, since in (2.23), (2.24) and in the paragraph following it $k \rightarrow \infty$ as $\mu \rightarrow 0$. If we redefine $I_t(x, y)$ as $\inf I_t(\phi)$ where $\phi \in C_t$, $\phi(0) = x$, $\phi(t) = y$ and take $k = 1$ in (2.23), (2.24), then the proof of (2.11) remains correct. To prove the reverse inequality (2.5), consider just the case $\phi(t, x) \neq y$. Let

$$\begin{aligned}\tilde{C}_\delta &= \{(z, s); 0 \leq s \leq t, |\phi(t-s, z) - y| \leq \delta\}, \\ \tau_\delta^\epsilon &= \inf \{t; \xi^\epsilon(t) \in \tilde{C}_\delta\}.\end{aligned}$$

Then, by the strong Markov property,

$$\begin{aligned}p_\epsilon(t, x, y) &\leq \int_0^t p_x(\tau_\delta^\epsilon \in ds) \sup_{(z, s) \in \partial \tilde{C}_\delta} p_\epsilon(t-s, z, y) \\ &\leq \frac{A(\delta)}{\epsilon^n} P_x(\tau_\delta^\epsilon \leq t).\end{aligned}$$

Using Theorem 1.1 (as in the proof of Theorem 1.3) one finds that the left-hand side of (2.5) is bounded above by $-i_\delta$, where

$$i_\delta = \inf I_t(\phi), \phi \in C_t, \phi(0) = x, \min_{0 \leq s \leq t} \text{dist} \{(\phi(s), s), \partial \tilde{C}_\delta\} = 0.$$

As $\delta \downarrow 0$, $i_\delta \uparrow i_0$ and, as is easily seen, $i_0 \geq I_t(x, y)$.

Similarly, the assertion of Theorem 3.1 needs to be corrected by redefining $I_t^0(x, y)$ as $\inf I_t(\phi)$, $\phi \in C_t$, $\phi(0) = x$, $\phi(t) = y$, $\phi(s) \in D$ if $0 \leq s \leq t$. The proof of (3.9) is obtained from the original proof by taking $k = 1$ in (3.14). As for (3.3), we proceed as in the case of (2.5), but replace \tilde{C}_δ by the set

$$\{(z, s); s \leq t, |\phi(t-s, z) - y| \leq \delta, \phi(t-u, z) \in D \text{ if } u \in [0, s]\}.$$

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