

# Stochastic Differential Equations for Sticky Reflecting Brownian Motion

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(based on joint work with G. Peskir (Manchester))

We study the SDE system

$$\begin{aligned}dX_t &= \frac{1}{2} d\ell_t^0(X) + I(X_t > 0) dB_t \\ I(X_t = 0) dt &= \frac{1}{2\mu} d\ell_t^0(X)\end{aligned}$$

for reflecting Brownian motion  $X$  in  $\mathbb{R}_+$  sticky at 0, where  $X$  starts at  $x$  in the state space,  $\mu \in (0, \infty)$  is a given constant,  $\ell^0(X)$  is the local time of  $X$  at 0, and  $B$  is a standard Brownian motion. We prove that the system has a jointly unique weak solution but has no strong solution. The latter fact verifies Skorokhod's conjecture on sticky reflecting Brownian motion and provides alternative arguments to those given in the literature.