Variably Skewed Brownian Motion

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Abstract

Given a standard Brownian motion B, we show that the equation
$X_t = x_0 + B_t + beta(L_t^X)$, t geq 0,
has a unique strong solution X. Here L^X is the symmetric local time of X at 0, and $beta$ is a given differentiable function with $beta(0) = 0$, whose derivative is always in $(-1,1)$. For a linear function $beta$, the solution is the familiar skew Brownian motion.

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Pages: 57-66

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