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A STRONG AND WEAK APPROXIMATION SCHEME FOR STOCHASTIC DIFFERENTIAL EQUATIONS DRIVEN BY A TIME-CHANGED BROWNIAN MOTION

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Abstract: This paper establishes a discretization scheme for a large class of stochastic differential equations driven by a time-changed Brownian motion with drift, where the time change is given by a general inverse subordinator. The scheme involves two types of errors: one generated by application of the Euler–Maruyama scheme and the other ascribed to simulation of the inverse subordinator. With the two errors carefully examined, the orders of strong and weak convergence are established. In particular, an improved error estimate for the Euler–Maruyama scheme is derived, which is required to guarantee the strong convergence. Numerical examples are attached to support the convergence results.

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