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Limiting distributions of randomly accelerated motions. (English) Zbl 0927.60033

Lith. Math. J. 37, No. 3, 219-229 (1997) and Liet. Mat. Rink. 37, No. 3, 295-308 (1997).

Summary: The process $\{X(t); t > 0\}$, representing the position of a uniformly accelerated particle (with Poisson-paced) changes of its acceleration, is studied. It is shown that the distribution of $X(t)$ (suitably normalized), conditionally on the number n of changes of acceleration, tends in distribution to a normal variate as n goes to infinity. The asymptotic normality of the unconditional distribution of $X(t)$ for large values of t is also shown. The study of these limiting distributions is motivated by the difficulty of evaluating exactly the conditional and unconditional probability laws of $X(t)$. In fact, the results obtained permit us to give useful approximations of the probability distributions of the position of the particle.

MSC:

60F05 Central limit and other weak theorems
60J20 Applications of Markov chains and discrete-time Markov processes on general state spaces (social mobility, learning theory, industrial processes, etc.)

Keywords:

order statistics; central limit theorem; uniform acceleration; Poisson process

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