The CLTs can be applied to compare the asymptotic efficiency of different estimators of queueing parameters [1, 3]. More generally, such indirect estimation methods can be viewed as nonlinear control-variable estimators, which are asymptotically equivalent to linear control-variable estimators [3].

References

[1] J.S. Carson and A.M. Law, Conservation equations and variance reduction in queueing simulations, Op. Res. 28 (1980) 535–546.
[2] P.W. Glynn and W. Whitt, A central-limit-theorem version of $L=\lambda W$, Queueing Systems 1 (1986) 191–215.
[3] P.W. Glynn and W. Whitt, Indirect estimation via $L=\lambda W$, Op. Res., to appear.
[4] P.W. Glynn and W. Whitt, Ordinary CLT and WLLN versions of $L=\lambda W$, Math. Op. Res., to appear.
[5] P.W. Glynn and W. Whitt, Extensions of the queueing relations $L=\lambda W$ and $H=\lambda G$, Op. Res., to appear.

Brownian Models of Open Queueing Networks: Product-form Stationary Distributions
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We consider a class of multidimensional diffusion processes that arise as heavy traffic approximations for open queueing networks. A necessary and sufficient condition is derived for such a process to have a stationary distribution with a separable (product form) density. When that condition is satisfied, the stationary distribution is exponential and all standard performance measures can be written out in explicit formulas.

2.15. Random walks

Windings of Planar Random Walks
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Let $X_1, X_2, X_3, \dots$ be a sequence of i.i.d. $\mathbb{R}^2$-valued bounded random variables with mean vector zero and covariance matrix identity. Let $S=(S_n;\ n=0,1,2,\dots)$ be the random walk defined by $S_n=\sum_{i=1}^{n} X_i$. Let $\phi(n)$ be the winding of S at time n, i.e. the total angle wound by S around the origin up to time n. Under certain regularity and symmetry conditions on the distribution of X_1, we show that the distribution of $2\phi(n)/\log n$ converges to the distribution with density $1/(2\cosh(\pi\omega/2))$.