Independent Sampling of a Stochastic Process

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Stoch. Proc. Appl. Vol. 74, 151-164 (1998)

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We investigate the question of when sampling a stochastic process X = {X(t): t≥0} at the times of an independent point process ψ leads to the same empirical distribution as the time-average limiting distribution of X. Two main cases are considered. The first is when X is asymptotically stationary and ergodic, and ψ satisfies a mixing condition. In this case, the pathwise limiting distributions in function space are shown to be the same. The second main case is when X is only assumed to have a constant finite time average and ψ is assumed a positive recurrent renewal processes with a spread-out cycle length distribution. In this latter case, the averages are shown to be the same when some further conditions are placed on X and ψ.