

Fast Approximation of the Antithetic Random Variables Method for Regenerative Estimation

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This report examines the application of the antithetic random variables method to the regenerative estimation of queueing systems. The antithetic random variables method is a simple and broadly applicable variance reduction technique. However, its direct application to regenerative estimation is challenging due to the low generation rate of pseudorandom negatively correlated samples using a straightforward algorithm, as well as the specific characteristics of the regenerative estimation approach. To address these limitations, we propose an approximation of the method based on approximating the original cumulative distribution function by a piecewise-quadratic function. This approach enables a significantly higher rate of sample generation.