Regenerative Steady-State Simulation of Discrete-Event Systems

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The regenerative method possesses certain asymptotic properties that dominate those of other steady-state simulation output analysis methods, such as batch means. Therefore, applying the regenerative method to steady-state discrete-event system simulations is of great interest. In this paper, we survey the state of the art in this area. The main difficulty in applying the regenerative method in our context is perhaps in identifying regenerative cycle boundaries. We examine this issue through the use of the "smoothness index." Regenerative cycles are easily identified in systems with unit smoothness index, but this is typically not the case for systems with nonunit smoothness index.We show that "most" (in a certain precise sense) discrete-event simulations will have nonunit smoothness index, and extend the asymptotic theory of regenerative simulation estimators to this context.