Review of: "Counting Processes with Multiple Randomness: Examples in Queuing Theory"

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The authors discuss a departure process from a stable, general single-server queue in statistical equilibrium and introduce a counting process with multiple sources of randomness to model the inter-departure time as a random variable. They argue that the inter-departure time cannot be fully described by a single random variable over the entire sample space Ω. Instead, they propose dividing Ω into subsets Φ_j and Ψ_j to distinguish between the states of the server being idle or busy after the j-th departure. Using this decomposition, they derive the probability density function (pdf) of the inter-departure time.

The authors criticize the established work by Burke (1956)[2], and they also challenge the results related to queuing networks by Jackson, which are based on Burke's findings.

I disagree with the authors' viewpoint. The inter-departure time $(\tau_{j+1}-\tau_j)$ can be adequately described as $I_j\delta_{Q_j,0}+S_{j+1}$, with all the variables, I_j,$\delta_{Q_j,0}$, S_{j+1}, being random variables defined over the entire sample space Ω. Therefore, there may not be a necessity to introduce a counting process with multiple sources of randomness. As demonstrated by the authors in (3.2), the marginal distribution of $(\tau_{j+1}-\tau_{j})$ exists and is consistent with Burke's results. I cannot agree that Burke's discussion is fundamentally flawed based on the results. The authors seem to offer an alternative perspective on the conditional estimation of the pdf of the inter-departure time.

I do not recommend the publication of the manuscript.