REVIEWER REPORT
for
"Quasi-Monte Carlo Methods: What, Why, and How?"

Reviewer Recommendation: Accept with minor revision

The paper provides a comprehensive tutorial on Quasi-Monte Carlo (qMC) methods, focusing on their application in approximating high-dimensional integrals, particularly expectations of the form $\mu = E[f(X)]$. The authors cover the theoretical foundations, practical implementations, and diverse applications of qMC methods, emphasizing low discrepancy (LD) sequences as a superior alternative to traditional Monte Carlo (MC) methods and grid-based approaches.

The paper is a valuable contribution to the literature on Quasi-Monte Carlo methods, offering a well-structured tutorial that bridges theory and practice. Its strengths lie in its clear exposition, illustrative examples, and broad applicability across disciplines. Based on the reviewer's best assessment, this paper should be accepted for publication with minor revisions.

Main Suggestions:

1. Add a simple but practical application, like option pricing under Black-Scholes model, as an illustrative example. This reviewer finds the illustrative example in Section 2 lacks practical relevance. In addition to showing the advantages of the qMC point sequences, a more practical example provides a much stronger motivation for users to replace MC with qMC.
2. Section 7 mentions variance reduction techniques such as importance sampling (Section 7.1) and control variate (Section 7.2). This reviewer suggests elaborating how variance reduction techniques, which were originally proposed for Monte Carlo methods, can be applied to qMC methods and whether these techniques and effective and in what ways they are effective.
3. Section 7.3 seems to be a bit disconnected with the rest of the paper, with some undefined notations like $\boldsymbol{n}$ and $\boldsymbol{d}$. Are these the vector versions of n and d? This reviewer suggests adding more details and discussions in this section.

Minor Issues:

1. One line below Equation (6) on page 3: Is there a specific reason to show the value of μ in such a high accuracy? If there is a reason, maybe it should be clearly explained.
2. The authors mention the van der Corput sequence a few times (e.g., 4 lines above Equation (9), first line on page 7, and other occurrences). For readers who don't know what this sequence is, such as this reviewer, it would be helpful to provide some explanations and references.
3. Is Equation (14) supposed to be an equation? It looks very strange.
4. The last line on page 9 is just a reference…
5. First line in Section 3.4: The acronym qMC is defined and used many times, why not use it here?
6. Figure 9 on page 13. The $x_0 = \Delta$ equation in the figures overlaps with some markers, which makes it hard to see. Please reposition it.

7. The legends in Figure 12 and Figure 13 are too small.
8. First line after Equation (43): “[(]” seems to be a typo.
9. Third line in Section 7: On example ➔ One example.