

Quantum Monte-Carlo integration for uncertainty quantification in structural problems: An early attempt

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ABSTRACT

Since its early conceptual days, decades ago, the idea of quantum computing has been bound to the hopeful expectation of surpassing the limits set by classical computational methods. While the much-expected era of quantum supremacy is yet to come and the respective hardware is somewhat limited, quantum algorithms are progressively being introduced in various fields of computational sciences. As a modest proof of concept, we attempt to solve a simple probabilistic structural problem using an algorithm well-suited for the NISQ (Noisy Intermediate Scale Quantum) era. As described in [1] the response function is approximated as a Fourier-series decomposition and the individual sums with respect to the random variable are calculated using a known amplitude-estimation algorithm.

REFERENCES

- [1] Steven Helberg, Quantum Monte-Carlo Integration: The Full Advantage in Minimal Circuit Depth. arXiv:2105.09100v2, 2021