

Peer Review

Review of: "A Review of Formal Methods in Quantum Circuit Verification"

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This paper is a review focusing on formal methods for quantum circuit verification, yet the discussion of some content is superficial, and there remains considerable room for improvement in multiple aspects.

(1) The comparison of various formal methods is still limited to qualitative descriptions, and the discussion on the core challenges of combining quantum circuits with formal verification lacks depth and substance. It is recommended to enhance the depth of content by supplementing detailed expositions of core concepts and methods.

(2) For cases in key application fields such as quantum algorithms, quantum compilers, and quantum hardware, no representative cases have been selected for in-depth analysis, with only a superficial mention of verification directions. This fails to provide researchers in the field with referable verification ideas and implementation methods.

(3) The introduction to the basic knowledge of quantum circuits in Section 2.1 has poor connection with the core content in the subsequent sections. Moreover, such basic knowledge is all available in textbooks and need not be elaborated in a review paper. It is recommended to abridge some content and focus on the introduction of the core concepts and knowledge of the paper.

(4) Abridge the references with low relevance to the research topic (e.g., some fundamentals of quantum computing) and retain the core and latest research achievements in the field. Sort out the corresponding relationship between the discussion in each section and the references to ensure that all viewpoints are directly supported by literature, and mark the core references for key viewpoints.

Declarations

Potential competing interests: No potential competing interests to declare.