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Analysis of Tandem Detonator Algorithm Optimized by Quantum Algorithm

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Abstract : The high complexity of the algorithm of the autonomous tandem detonator system creates an optimization problem due to the parallel operation of several machine states of the system. Many years of experience and classic analyses have led to a partially optimized model. Limitations on the energy resources of this class of autonomous systems make it necessary to search for more effective methods of optimisation. The use of the Quantum Approximate Optimization Algorithm (QAOA) in these studies shows the most promising results. With the help of multiple evaluations of several qubit quantum circuits, proper results of variable parameter optimization were obtained. In addition, it was observed that the increase in the number of assessments does not result in further efficient growth due to the increasing complexity of optimising variables. The tests confirmed the effectiveness of the QAOA optimization method.

Keywords : algorithm analysis, autonomous system, quantum optimization, tandem detonator
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