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Implementing entangling gates via quantum walks through branching graphs. DMITRY SOLENOV, THOMAS CAVIN, Department of Physics, Saint Louis University, St. Louis, MO 63103 — Efficient quantum gates are essential to quantum computing. It was found recently that quantum walks can enhance performance of quantum gates. We investigate how the propagation of a complicated, branching system can be solved analytically by first mapping it to linear chain. We found that certain types of systems, including systems of n qubits, can be algorithmically mapped to a system of disjoint linear chains. In particular, we found a solution for the 3 qubit system that performs either a trivial return walk or a return walk with a phase of pi introduced.

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