

1106-81-1331

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Recently many researchers in various fields pay attention to the quantum walk on graphs. The Grover evolution matrix of a graph is efficient for the graph isomorphism problem, and various approach are done in the graph isomorphism problem. The spectrum of the Grover evolution matrix of a graph G is given from that of the transition operator of a simple random walk on G . Furthermore, the Szegedy evolution matrix of a quantum walk on a graph G is given from that of the transition operator of a random walk on G .

One of our main purposes is to generalize the above facts on the Grover evolution matrix and the Szegedy evolution matrix. We present a generalized evolution matrix of a graph and compute its characteristic polynomial. (Received September 12, 2014)