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Adiabatic quantum computational properties of Hopf link OMAR SHEHAB, University of Maryland, Baltimore County — Topological quantum computation has recently become an active field of research with a promise of tackling decoherence. Another track of research effort has presented adiabatic quantum computation as a candidate for implementing quantum computers with presently available technologies. We investigate the potential of combining the strengths of both regime. This report conducts adiabatic evolution on low dimensional topological constructs. We study the properties of a Hopf link related to adiabatic quantum computation. The graph and Seifert surface for the link are calculated. The Ising model representing the Hopf link is then derived from the surface. The Edwards-Anderson Hamiltonian is also solved for the Ising model. The associated eigenfunction and eigenvalues are then used to investigate computational problems which can be represented by the ground state of the adiabatic Hamiltonian. We also consider a type II Reidemeister move on the link. The graph and Seifert surface are calculated for the new link. Then the Edwards-Anderson Hamiltonian is solved for the associated Ising model. The constraints of adiabatic evolution are calculated for both cases. Finally, computational problems are investigated which can be represented by the ground state of the adiabatic Hamiltonian.

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