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Z_2 lattice Gauge Theory DERAR ALTARAWNEH, MICHAEL ENGELHARDT, New Mexico State University — We have studied Z2 lattice Gauge theory, in which the lattice links are associated with values ± 1, using the standard plaquette action. We employed two methods. Firstly we used Metropolis Monte Carlo simulations both in 1+1 space-time and 3+1 space-time dimensions. We calculated averages of Wilson loops as a function of the coupling constant c. Secondly, we only considered 1+1 space-time dimensions and used analytical methods. We used the local gauge transformations and the center transformations to reduce the number of degrees of freedom. Each local transformation enables us to fix one link in the lattice, which means reducing the degrees of freedom by one. Our system consisted of (nxn) lattice points, so applying the local gauge transformations at (n^2-1) points allows us to fix (n^2-1) links and reduce the degrees of freedom by (n^2-1) units. Also using periodic boundary conditions and center transformations, the number of degrees of freedom is reduced by two more units. After reducing the link degrees of freedom, they can be mapped to plaquette variables, in terms of which the system becomes solvable analytically. At the end we verified agreement between the simulation method and the analytical method in our results for the average action.

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