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Lattice Formulation of Two Dimensional Topological Field Theory

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We investigate an integrable property and observables of 2 dimensional $N=(4,4)$ topological field theory defined on a discrete lattice by using the “orbifolding” and “deconstruction” methods. We show that our lattice model possesses the integrability and the partition function reduces to matrix integrals of scalar fields on sites in consequence. We make clear meaningful differences between the discrete lattice and differentiable manifold, which would be important to a study of topological quantities on the lattice. We also propose a new construction of $N=(2,2)$ supersymmetric lattice theory, which is realized by a suitable truncation of scalar fields from the $N=(4,4)$ theory.

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