Graph Theoretical Approach to Coherent States of Fuzzy Membrane

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Abstract

We discuss how to make two-dimensional surfaces from the fuzzy representation of membrane.The representation is constructed as a kind of Dirac operator.The surfaces are defined by 0-determinant manifolds of the Dirac operator.The method in this work has a relation to a graph theory. It is possible to interpret the Dirac operator as an extension of adjacency matrix of a graph.The surfaces given by this way are regarded as plumped out graphs embedded in $\mathbb{R}^3$. There is a conjecture that all genus surfaces are constructed. This conjecture is given by the observation of many examples using numerical calculations. In this study, we investigate how a graph generate S^2 and another graph makes T^2, analytically. We also examine the mechanism of binding surfaces. For some special cases, conditions of binding surfaces are determined.