Curved Spaces in Matrix Model

Department of Physics, Kyoto University Yusuke Kimura
E-mail: y.kimura@qmul.ac.uk

This talk is based on the collaboration with K. Furuta, M. Hanada and H. Kawai [3].

In the previous papers [1, 2], we have introduced a new interpretation of the matrix model in which covariant derivatives on any curved space can be expressed by large-N matrices. It has been shown that the diffeomorphism and local Lorenz symmetry are included in the unitary symmetry, and the Einstein equation is obtained from the equation of motion of the matrix model. In this talk, we investigated the equation of motion for a covariant derivative with a torsion. We considered possibilities of embedding the dilaton and the B-field into the torsion field. It was shown that it was consistent with the equation of motion of massless fields in the bosonic string theory at the linear order. However, fields with negative norm modes could propagate in general. This fact may suggest the modifications of the matrix space, and we discussed some possible prescriptions. We also showed that if we add a cubic term to the action of the matrix model, the coefficient of the term can be interpreted to be a constant field strength of the B-field.

References

[1] M. Hanada, H. Kawai and Y. Kimura, *Describing curved spaces by matrices*, Prog. Theor. Phys. **114** (2006) 1295; hep-th/0508211.

[2] M. Hanada, H. Kawai and Y. Kimura, *Curved superspaces and local supersymmetry in supermatrix model*, Prog. Theor. Phys. **115** (2006) 1003; hep-th/0602210.

[3] K. Furuta, M. Hanada, H. Kawai and Y. Kimura, *Field Equations of Massless Fields in the New Interpretation of the Matrix Model*, hep-th/0610***.