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The κ-Supersymmetric Non Abelian Born Infeld Action for a $D3$-brane

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Abstract

In the previous submission of this paper we claimed to have solved the problem of constructing a consistent non-abelian Born Infeld action which is κ–supersymmetric to all orders. Our method was based on an extension of target superspace to N×N matrix–valued objects for all the items appearing in the geometric construction. Then we applied the *double first order formalism* introduced by us in the previous construction of abelian brane actions to the non–abelian case and we claimed that the Bosonic action given by the prescription of the *symmetrized trace* could be promoted to a fully kappa supersymmetric one. Unfortunately there is an internal inconsistency, relative to $U(N)$ gauge invariance in the matricisation of target superspace geometry and there is a subtle inconsistency in the variation of the symmetric trace action due to the loss of associativity of the underlying symmetrized product. Because of that the entire construction previously submitted does not stand on its feet. Consequently the present resubmission is done in order to disclaim our previously claimed result and also to express our sincere gratitude to our friends Paul Howe and Ulf Lindstrom who, with their constructive criticism and private correspondence, have helped us to understand where the bugs in our construction were.

1 Introduction

As stated in the abstract this resubmission of the paper which appeared in the Archive with the same title is done in order to disclaim the result we had previously claimed, due to the discovery of ill-fated inconsistencies that make the entire construction not stand on its feet.

The previously presented non–abelian extension of the rheonomic construction of D–brane actions based on the double first order formalism is wrong.

The rheonomic construction and the double first order formalism work perfectly well and are valuable tools to establish kappa supersymmetry in the abelian case.

What is wrong and inconsistent is the matrix extension of superspace and the consequent application of the geometric constructions to this matrix extended superspace.

As also stated in the abstract this resubmission is also done in order to express our gratitude to our friends Paul Howe and Ulf Lindstrom who have helped us to understand the internal subtle bugs of our construction with their constructive criticism expressed through private correspondence.