

Abstract

We argue that one can relax the requirements of the non-associative three-algebras recently used in constructing $D=3$, $N=8$ superconformal field theories, and introduce the notion of “relaxed three-algebras”. We present a specific realization of the relaxed three-algebras in terms of classical Lie algebras with a matrix representation, endowed with a non-associative four-bracket structure which is prescribed to replace the three-brackets of the three-algebras. We show that both the $so(4)$ -based solutions as well as the cases with non-positive definite metric find a uniform description in our setting. We discuss the implications of our four-bracket representation for the $D=3$, $N=8$ and multi M2-brane theory and show that our setup can shed light on the problem of negative kinetic energy degrees of freedom of the Lorentzian case.