TOWARDS GAUGE PRINCIPLE FOR SEMIGROUPS

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The standard gauging procedure is extended to the (super)semigroups consisting of a disjoint subgroup being the ordinary group of internal symmetry and an ideal containing noninvertible transformations arising in supersymmetric theories. The analogue of the conjugation is brought in and used when deriving the nondiagonal gauge-like transformations which are proper for the nondiagonal covariance proposed. The latter is the origin of a new unavoidable field lying in the same representation as the usual gauge field and giving rise to the effect like torsion. The operator bilinear in these fields, which generalizes the covariant derivative in the adjoined representation, is given. The possible form of the Lagrangian and equation of motion is outlined.

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1. Introduction

Many modern physical models are based on the gauge principle which introduces field interactions by localizing symmetries of a theory. This procedure, called the gauging of a corresponding group, allows one to build (internal) gauge theories of strong, weak and electromagnetic interactions [1], where gauge transformations act on internal degrees of freedom, and (external) gauge theories of gravity [2], where gauge transformations are regarded as coordinate changes. Also the string theories can be identified as a gauge theory of the conformal group in two dimensions [3]. When supersymmetry comes into play [4], groups are replaced by supergroups [5], and all variables of the theory are given the same prefix without paying attention to difficulties [6] and new key features arising. One of the latter is the fact that uncommon noninvertible and degenerate transformations come into existence. They form the ideal of the supersemigroup which is the result of extending the supergroup formed by the invertible transformations and restricted properly (see [5] for details). In evident cases the implied "super"