

**On cohomology and deformations of the Lie superalgebra of
contact vector fields on $S^{1|m}$**

Abstract. The classical deformation theory of Lie algebras and modules over Lie algebras traditionally deals with one parameter deformations (see M. Gersthanhaber, A. Nijenhuis and R. W. Richardson.) It is, however, natural to consider, as in other deformation theories, multi-parameter deformations. This viewpoint was initiated by A. Fialowski and D. Fuks. The Constructions of deformations of the natural embedding of $\text{Vect}(S^1)$ of vector fields in the circle S^1 inside the Poisson algebra of Laurent series on $\dot{T}^*(S^1)$ (resp. the Lie algebra of pseudodifferential operators) are considered by V. Ovsienko and C. Roger . The multiparameter deformations of the Lie derivative action of the Lie algebra $\text{Vect}(\mathbb{R}^n)$ of vector fields on \mathbb{R}^n on the space of symmetric and antisymmetric tensor fields was considered by B.Agrebaoui F.Ammar, M.Ben ammar, N.Ben Fraj, V.Ovsienko and P. Lecomte.

The first step of any approach to the deformation theory consists in the study of infinitesimal deformations. Given a Lie algebra (or superalgebra) \mathfrak{g} and a \mathfrak{g} -module V , the infinitesimal deformation is defined, up to equivalence, by the cohomology classes c_1, \dots, c_n in $H^1(\mathfrak{g}, \text{End}(V))$.

The second step is to compute the integrability conditions of infinitesimal deformations.

For the vector fields Lie superalgebra case, the first examination apperries in the end of the seminal paper on modular forms by P.B. Cohen, Y. Manin, and D. Zagier. In my talk, I'll speak about a series of recent papers with N.Ben Fraj, S.Omri and S. Mansour, where the pseudodifferential operator module-valued first cohomology groups cohomology of the Lie superalgebra $\mathcal{K}(n)$ of contact vector fields on $S^{1|n}$ (or $\mathbb{R}^{1|n}$) is considered and multiparameter deformation has been studied.

The main tools of this lecture are in the papers:

- On the Cohomology of the Lie Superalgebra of contact vector fields on $S^{(1|2)}$. Non-linear Mathematical Physics Vol 13 (2006) Number 4 523-534 (with N.Ben Fraj et Salem Omri).

- On the cohomology of Lie superalgebra of contact vector fields on $S^{1|m}$ Accept pour publication au journal Communications in Algebra (with Sabeur Mansour).

-Deforming the Lie Superalgebra of Contact Vector Fields on $S^{1|2}$. Accepted for publication in journal of Geometry and Physics (with Sabeur Mansour).