Mathematical Physics

Essential variational Poisson cohomology

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In our recent paper [DSK11] we computed the dimension of the variational Poisson cohomology for any quasiconstant coefficient matrix differential operator K of arbitrary order with invertible leading coefficient, provided that the algebra of differential functions is normal and is an algebra over a linearly closed differential field. In the present paper we show that, for K skewadjoint, this cohomology, viewed as a Z-graded Lie superalgebra, is isomorphic to the finite dimensional Lie superalgebra of Hamiltonian vector fields over a Grassman algebra. We also prove that the subalgebra of `essential' variational Poisson cohomology, consisting of classes vanishing on the Casimirs of K, is zero. This vanishing result has applications to the theory of bi-Hamiltonian structures and their deformations. At the end of the paper we consider also the translation invariant case.

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