

## REMARKS ON POISSON REDUCTION ON $K$ -SYMPLECTIC MANIFOLDS

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**Abstract.** Two reduced standard  $k$ -symplectic Poisson manifolds with respect to the action of a Lie group  $G$  are considered, and the relation between the corresponding Poisson structures is established.

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### 1. Introduction

Starting with a Poisson manifold, one can construct by reduction other Poisson manifolds. This procedure is well known and important in the symplectic mechanics having applications in fluids [5], electromagnetism and plasma physics [4], etc. Let us mention also that Juan-Pablo Ortega and Tudor Rațiu [7] described the Poisson reduction specifying the assumptions under that a Poisson manifold could be reduced to a Poisson manifold, too.

In what follows we shall present the Poisson reduction in the case of the standard  $k$ -symplectic manifold  $(T_k^1)^*\mathbb{R}^n$  with the canonical  $k$ -symplectic structure induced from  $(\mathbb{R}^n, \omega_0)$  [1]. Then, using a diffeomorphism, we can endow  $T_k^1\mathbb{R}^n$  with a  $k$ -symplectic structure that will be reduced, too (the two manifolds  $T_k^1\mathbb{R}^n = T\mathbb{R}^n \oplus \mathbb{R} \oplus T\mathbb{R}^n$  and respectively  $(T_k^1)^*\mathbb{R}^n = T^*\mathbb{R}^n \oplus \mathbb{R} \oplus T^*\mathbb{R}^n$  will be identified with the Whitney sum of  $k$ -copies of  $T\mathbb{R}^n$  and respectively of  $T^*\mathbb{R}^n$  [6]). Finally, we shall discuss the relation between the two induced Poisson structures on the reduced manifolds.

In order to do this, we consider an appropriate action of a Lie group  $G$  on the two manifolds. Such canonical actions can be obtained, for instance, by lifting an arbitrary action of  $G$  on  $\mathbb{R}^n$  to  $(T_k^1)^*\mathbb{R}^n$  and  $T_k^1\mathbb{R}^n$  respectively.