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Jonathan Herman

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Existence and Uniqueness of Weak Homotopy Moment Maps

Jonathan Herman
Department of Pure Mathematics, University of Waterloo
j3herman@uwaterloo.ca

Abstract

We show that the classical results on the existence and uniqueness of moment maps in symplectic geometry generalize directly to weak homotopy moment maps in multisymplectic geometry. In particular, we show that their existence and uniqueness is governed by a Lie algebra cohomology complex which reduces to the Chevalley-Eilenberg complex in the symplectic setup.

Contents

1 Introduction

Recall that for a symplectic manifold (M, ω), a Lie algebra $\mathfrak{g}$ is said to act symplectically if $\mathcal{L}_{V_\xi}\omega = 0$, for all $\xi \in \mathfrak{g}$, where V_ξ is its infinitesimal generator. A symplectic group action is called Hamiltonian if one can find a moment map, that is, a map $f : \mathfrak{g} \to C^\infty(M)$ satisfying

$$df(\xi) = V_\xi \lrcorner \omega,$$