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Differential forms on singular varieties and symplectic invariants

There are studied germs of singular varieties in a symplectic space. And especially the so called ghost symplectic invariants which are induced purely by singularity. Algebraic restrictions of differential forms to singular varieties are introduced and we show that the ghost invariant is exactly the invariant of the algebraic restriction of the symplectic form. This follows from the generalization of Darboux-Givental theorem from non-singular submanifolds to arbitrary quasi-homogeneous varieties in a symplectic space. Using algebraic restrictions we introduce new symplectic invariants and explain their geometric meaning. We prove that a quasi-homogeneous variety N is contained in a non-singular Lagrangian submanifold if and only if the algebraic restriction of the symplectic form to N vanishes. We show that the method of algebraic restriction is a powerful tool for various classification problems in a symplectic space. We illustrate this by complete solutions of symplectic classification problem for the classical A , D , E singularities of curves and for the regular union singularities.