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Abstracts of Short Communications and Posters

Section:

5. Differential Geometry and Global Analysis

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The Adjoint Formulation and Symplectic Reduction
We discuss the geometry underlying the *symplectic reduction* of an infinite-dimensional symplectic manifold (P, ω) with an infinite-dimensional symmetry group G and a momentum map $\mathbf{\Psi} : P \to \mathcal{G}^*$. Our main tool is a *generalized adjoint formulation* which asserts that

$$Z_A(p) = (\omega_p^\sharp \circ d\mathbf{\Psi}(p)^\star) \cdot A \ ,$$

where $Z_A : P \to TP$ is the infinitesimal generator corresponding to $A \in \mathcal{G}$ and $d\mathbf{\Psi}(p)^\star : \mathcal{G} \to T_p^*P$ is the *natural adjoint* of $d\mathbf{\Psi}(p) : T_pP \to \mathcal{G}^*$. We show how the generalized adjoint formulation plays a fundamental role in symplectic reduction and discuss various applications of this formulation to (1) the construction of a *universal symplectic splitting* for almost Hermitian G-manifolds, (2) the geometry of symplectic reduction and dynamical reconstruction, (3) linearization stability and bifurcations of momentum maps, (4) the structure of the constraint space, and (5) equilibria stability and singular reduction.