

On stable orbit types of isometric actions on Lorentz manifolds

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The classification of the orbit types of an isometric action on a Lorentz manifold involves problems which are not present in the Riemannian case. Namely, in the Riemannian case, assuming that the acting group is closed in the full isometry group of the manifold, the action is proper [3] and thus the results concerning classification of orbit types in case of proper actions apply [2]. However, proper actions have compact stabilizers and thus are but exceptions in case of Lorentz manifolds.

As a possible approach to the classification of orbit types of isometric actions on Lorentz manifolds, the concepts of stable and unstable orbit types were introduced [1]. Moreover, it was shown that if an isometric action on a Lorentz manifold has only orbits of stable and unstable types and the set of unstable orbit types is countable, then the union of orbits of stable type is an open and dense set [1].

Thus the problem arises to give conditions under which an isometric action on a Lorentz manifold has only orbits of stable and of unstable types. The following result will be presented: If a Lorentz manifold is geodesically complete and has no conjugate points then any isometric action on this manifold has only stable and unstable orbit types.

References

- [1] Alekseevsky, D. V. and Szenthe, J., Orbits of stable type in Lorentzian G-manifolds. *In preparation*.
- [2] Palais, R., On the existence of slices for actions of non-compact Lie groups. *Ann. of Math.* **73**(1961), 295-323.
- [3] Yau, Shing Tung, Remarks on the group of isometries of a Riemannian manifold. *Topology* **16**(1977), 239-247.