

998-53-138

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Conjugate Loci of pseudoRiemannian 2-step Nilpotent Lie Groups with Nondegenerate Center.

We begin with the history of the problem, and include some pictures of 3-dimensional conjugate loci towards the end.

We determined the conjugate locus (with multiplicities) along all geodesics parallel or perpendicular to the center. When the center is 1-dimensional we obtained formulas in all cases, and when a certain operator is also diagonalizable these formulas become completely explicit. These results yielded some new information about the smoothness of the pseudoRiemannian conjugate locus.

For a well-known subclass of 2-step groups (pseudo H -type), we made a complete determination of the entire conjugate locus (including multiplicities). This class includes (generalized) Heisenberg groups (which have 1-dimensional centers and for which the aforementioned operator is diagonalizable). (Received February 22, 2004)