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RESEARCH ANNOUNCEMENTS

The purpose of this department is to provide early announcement of new results of such immediate importance to a substantial set of mathematicians that their communication to the mathematical community cannot await the normal time of publication. Research Announcements are communicated to the Bulletin by members of the Publications Committees listed on the inside back cover; manuscripts should be sent directly to any one of them. Each communicator is limited to accepting not more than six announcements each year; announcements are limited to 100 typed lines of 65 spaces each.

[*Note.* The criteria described above are new; in the transition period they will not necessarily be met by the announcements appearing in this issue.]

NONPOSITIVELY CURVED MANIFOLDS

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Let M be a simply connected, complete, Riemannian manifold of nonpositive sectional curvature. In [7], Eberlein and O'Neill have obtained a boundary $M(\infty)$ for M which is the set of asymptotic classes of geodesics in M. The limit set $L(G)$ of a group G of isometries is defined as the intersection with $M(\infty)$ of any orbit of G.

The following theorems may be considered as analogous results to several statements in Borel's density theorem for symmetric spaces [2].

THEOREM 1. *Let M be a simply connected, complete, Riemannian manifold of nonpositive sectional curvature and without Euclidean factor in its de Rham decomposition. Suppose that G is a subgroup of $I(M)$ and $L(G) = M(\infty)$. Then the centralizer $Z(G, I(M))$ is trivial. Moreover, either G has a proper, closed, invariant subset in $M(\infty)$ or G is semisimple.*

COROLLARY 1. *Let M be a complete, homogeneous, Riemannian manifold of nonpositive sectional curvature and without Euclidean factor in its de Rham decomposition. Then, either $I_0(M)$ has a proper, closed, invariant subset in $M(\infty)$*

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