Homogeneous geodesics in certain homogeneous manifolds

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Let $(M = G/H, g)$ be a homogeneous Riemannian manifold. A geodesic $\gamma(t)$ through $o = eK$ is called *homogeneous* if it is an orbit of a 1-parameter subgroup G, i.e. $\gamma(t) = \exp tX \cdot o$ for some $0 \neq X \in \mathfrak{g}$ the Lie algebra of G. Then $M = G/K$ is called *g.o. space* (or space with homogeneous geodesics) if any geodesic γ of M is homogeneous. A Riemannian manifold (M, g) is called *g.o. manifold* (or a manifold with homogeneous geodesics) if any geodesic γ of M is an orbit of a 1-parameter subgroup of the full isometry group of (M, g). Some examples of g.o. manifolds are the symmetric spaces, naturally reductive spaces, normal homogeneous spaces and weakly symmetric spaces. Besides their mathematical significance, homogeneous geodesics appear in physics and they have applications in optimization and deep learning.

In the present talk I will present joint works with Y. Wang, G. Zhao and H. Qin, concerning the classification of g.o. metrics in generalized Wallach spaces, M-spaces, and generalized C-spaces.