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Geodesic tubes and normal flow space forms. (English) Zbl 0910.53033

A locally Killing-transversally symmetric space (briefly KTS-space) is a Riemannian manifold \((M, g)\) admitting a unit Killing vector field \(\xi\) such that reflections with respect to the flow lines of that field are local isometries. It is worth noticing that locally KTS-spaces are locally homogeneous spaces. Moreover, when \(\eta\) is a contact form, \(\eta\) being the dual form of \(\xi\) with respect to \(g\), \((M, g)\) is called a contact locally KTS-space.

First, the authors collect some preliminaries about flow geometry and recall certain properties and useful characterizations of locally KTS-spaces. Moreover, they describe some useful facts about the extrinsic geometry of tubes about geodesics. Next, using the concept of quasi-umbilicity, the authors give necessary and sufficient conditions for a complete, contact locally KTS-space to be a space with constant \(\xi\)-sectional curvature.

Finally, they derive some characterizations of normal flow space forms by considering the shape operator of tubes about flow lines or tubes about horizontal geodesics.

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MSC:
53C25 Special Riemannian manifolds (Einstein, Sasakian, etc.)
53C40 Global submanifolds
53C12 Foliations (differential geometric aspects)
53C15 General geometric structures on manifolds (almost complex, almost product structures, etc.)

Keywords:
locally Killing-transversally symmetric spaces; normal flow space forms; tubes about geodesics; shape operator