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Tommy Murphy* (tmurphy@fullerton.edu), 800 N State College Blvd., Fullerton, CA 92831.

Totally geodesic submanifolds in Riemannian geometry. Preliminary report.

A natural and fundamental question in submanifold geometry is to classify all the totally geodesic submanifolds of dimension > 1 for a given Riemannian manifold. Little is known aside from Riemannian symmetric spaces, where one has (in theory) complete control of the curvature tensor. For example, whilst it is widely believed that such submanifolds do not exist for a generic metric, there is only one explicitly known example of this (certain Berger spheres). In this preliminary report, I will outline some progress on this problem. (Received January 16, 2015)