



SHARP GROWTH ESTIMATES FOR WARPING FUNCTIONS IN MULTIPLY WARPED PRODUCT MANIFOLDS

BANG-YEN CHEN AND SHIHSHU WALTER WEI

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Abstract. By applying an average method in PDE, we obtain a dichotomy between “constancy” and “infinity” of the warping functions on complete noncompact Riemannian manifolds for an appropriate isometric immersion of a multiply warped product manifold $N_1 \times_{f_2} N_2 \times \cdots \times_{f_k} N_k$ into a Riemannian manifold.

Generalizing the earlier work of the authors in [9], we establish sharp inequalities between the mean curvature of the immersion and the sectional curvatures of the ambient manifold under the influence of quantities of a purely analytic nature (the growth of the warping functions). Several applications of our growth estimates are also presented.

MSC: 31B05, 53C21, 53C42

Keywords: Growth estimate, L^q function, inequality, minimal immersion, squared mean curvature, warping function, warped product

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