

1027-58-14

Nelson Castaneda* (castanedan@ccsu.edu), 1590 Stanley Street, New Britain, CT 06053.
Hessians, Warped Product and Eigenvalues.

We use the Hessian-Weitzenböck formula to simplify the exposition of several well known theorems including the Hessian comparison theorem. We revisit the theory of concircular vector fields, give a simple new proof of Obata's theorem that characterizes the sphere as the only complete manifold admitting nonconstant solutions of $Hess u + u = 0$. We revisit the work of Ishihara and Tashiro and show how Obata's theorem is essentially contained in their work. We generalize a theorem of Tandai by proving that a manifold (not necessarily complete) that admits $n - 1$ linearly independent concircular vector fields is a manifold of constant sectional curvature. Finally we provide a unified treatment of the theorems of Lichnerowicz-Obata, Reilly, and Escobar regarding the first nonzero eigenvalue of the Laplacian under a positive lower bound of the Ricci curvature and suitable conditions of convexity of the boundary. (Received December 18, 2006)