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HARMONIC MAPS OF COMPLETE RIEMANNIAN MANIFOLDS

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1. Introduction

The theory of harmonic mappings of a Riemannian manifold into another has been initiated by J. Eells and J. H. Sampson([2]) and studied by many authors. In particular, R. M. Schoen and S. T. Yau([3]) proved the following theorem:

Theorem A. *Let M be a complete noncompact Riemannian manifold with nonnegative Ricci curvature and let N be a compact Riemannian manifold of nonpositive sectional curvature. Then every harmonic map of finite energy from M to N is constant.*

In this paper, we extend Theorem A under weaker assumptions by using Kato's inequality([1]) and characterize a harmonic map on complete Riemannian manifolds.

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2. Preliminaries

Let $\pi : E \to M$ be a Riemannian vector bundle over an m-dimensional manifold M, i.e., E is a vector bundle over M equipped with a C^∞-assignment of an inner product $<\ ,\ >$ to each fiber E_x of E over $x \in M$. Assume that a metric connection D is given on E, i.e., $D : A^p(E) \to A^{p+1}(E)$ is an $\mathbb{R}$-linear map such that if $f \in A^0$, $D(fs) = fDs + sdf$ and

$$d < s,t >=< Ds,t > + < s, Dt > \tag{2.1}$$

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