

# HARMONIC MAPS INTO GRASSMANNIAN MANIFOLDS

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A harmonic map from a Riemannian manifold into a Grassmannian manifold is characterized by a vector bundle, a space of sections of the bundle and the Laplace operator. This characterization can be considered as a generalization of Theorem of Takahashi about minimal immersions into a sphere (J. Math. Soc. Japan **18** (1966)) and implies the well-known fact that the Kodaira embedding is a harmonic map.

We apply the main result to generalize a Theorem of do Carmo and Wallach (Ann. of Math. **93** (1971)) and describe a moduli space of harmonic maps with constant energy densities and some properties about pull-back bundles and connections from an isotropy irreducible compact reductive Riemannian homogeneous space into a Grassmannian.

The ADHM-construction of instantons gives a family of maps into Grassmannians via monad theory. These maps are, in general, not harmonic maps, but have the same shapes as maps obtained in our generalized do Carmo-Wallach theorem. The both maps are obtained as deformation of “standard maps”. The conditions imposed on deformation are different from each other. We introduce functionals on the space of maps into Grassmannians.

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