VECTOR FIELDS AS HARONIC MAPS WITH POTENTIAL

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Abstract: This talk is based on some joint papers with J. Inoguchi, Institute of Mathematics, University of Tsukuba, Japan.

In our paper [IM14] we define the notion of magnetic map as a generalization of both magnetic curves and harmonic maps. A magnetic map is obtained as critical points of the LH functional, that is the energy functional together with a potential part.

As a vector field can be thought of as a map from the manifold to its tangent bundle and since the tangent bundle carries a natural magnetic field obtained from its almost Kaehlerian structure, we may ask when a vector field is a magnetic map?

Furthermore, we show that a unit vector field on an oriented Riemannian manifold is a critical point of the Landau Hall functional if and only if it is a critical point of the Dirichlet energy functional. Therefore, we provide a characterization for a unit vector field to be a magnetic map into its unit tangent sphere bundle.

Then, we classify all magnetic left invariant unit vector fields on 3-dimensional Lie groups.

References:

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[IM21] J. Inoguchi and M.I. Munteanu, Magnetic unit vector fields, submitted.