Research results (Yoshihiro OHNITA)

In the area of geometry, especially differential geometry and harmonic map theory, the following research results are presented so far.

Minimal Submanifolds and Geometric Variational Problems: A submanifold immersed in a Riemannian manifold whose volume is extremized is called a *minimal submanifold*. When a minimal submanifold always has non-negative second variation, it is said to be *stable*. The minimal submanifold is a generalization of the concept of *minimal surfaces*. Starting from the research on properties and eigenvalues of the Laplacian of homogeneous submanifolds obtained as standardly embedded R-spaces ([1],[2],[3]), we studied minimal isometric immersions of compact symmetric spaces into the standard sphere via the first eigenfunctions ([4]), stability of minimal submanifolds and determination of stable minimal submanifolds ([5], [7], [12], [65]), instability and stability of Yang-Mills fields ([9], [19]). On the other hand we studied differential geometry of real submanifolds in complex projective spaces ([8], [15], [23]). Moreover we focused on minimal Lagrangian submanifolds: Complex Lagrangian submanifolds in hyperkähler moduli spaces ([32]), Research on Hamiltonian stable Lagrangian submanifolds in complex projective spaces ([35], [37], [38], [40], [45]), Deformation and moduli spaces of special Lagrangian submanifolds ([39], [41], [48]).

Study of Harmonic Map Theory: In general a smooth map between two (semi-)Riemannian manifolds whose energy integral is extremized is called a *harmonic map*. Main results in harmonic map theory are as follows: Instability and stability of harmonic mapa ([6]), Stability and complex analyticities of pluriharmonic maps ([11], [13], [16], [20]). Classification of equivariant harmonic maps of generalized flag manifolds into complex projective spaces ([17]), Classification problem of minimal surfaces with constant Gaussian curvature ([10], [14]). Research on harmonic maps of Riemann surfaces into symmetric spaces via integrable system methods is most interesting ([18], [21], [22], [24], [25], [26], [27], [28], [29], [31], [32], [33], [34], [36], [42], [44]): Pluriharmonic maps into Lie groups and symmetric spaces and uniton solutions finite type solutions ([18], [34], [36]). Loop group actions and Morse theoretic deformations for harmonic maps ([21], [24]), topology of spaces of harmonic maps from Riemann spheres into compact symmetric spaces ([21], [24]). Gauge-theoretic approach to harmonic maps ([30], [31], [32], [33]). Quantum cohomology of Hermitian symmetric spaces of compact type ([29]).

Geometry of Isoparametic Hypersurfaces and Lagrangian Submanifolds : The Gauss image of an isoparametric hypersurface in the unit standard sphere is a compact minimal Lagrangian submanifold embedded in the complex hyperquadric $Q_n(\mathbb{C})$. Main results in joint works with Hui Ma (Tsinghua U. Beijing), Hiroshi Iriyeh (Ibraki U.) and Reiko Miyaoka (Tohoku U.) are as follows: Complete classification of compact homogeneous Lagrangian submanifolds in $Q_n(\mathbb{C})$ ([43]), Determination of Hamiltonian stability of Gauss images of all *homogeneous* isoparametric hypersurfaces ([43], [58], [59]), Hamiltonian non-displacesability problem of Gauss images of isoparametric hypersurfaces ([61], [62], [64]).

Submanifold Geometry related to Isoparametric Submanifolds in Finite and Infinite Dimensions: Isoparametric submanifolds are most fundamental objects. Determination of minimal Koike's orbits under the Hermann actions ([63]), Symplectic geometry of canonical embeddings of R-spaces into Kähler C-spaces ([65], [66]), Classification of complex submanifolds with parallel second fundamental form in complex projective spaces via differential geometric characterization of R-spaces ([67], [68]).