6 Feb. 2011

Results of my research (Nobutaka Boumuki)

I am interested in (A) Real semisimple Lie algebras and Symmetric spaces, (B) Submanifolds in Riemannian symmetric spaces and (C) Harmonic maps.

(A) *Real semisimple Lie algebras and Symmetric spaces*: In the paper (2) I and Noda give a way of constructing a simple para-Hermitian symmetric pair $(\bar{\mathfrak{g}}, \bar{\mathfrak{h}})$ from a simple irreducible pseudo-Hermitian symmetric pair $(\mathfrak{g}, \mathfrak{h})$ and a real form L of $(\mathfrak{g}, \mathfrak{h})$, where $\bar{\mathfrak{g}}$ is a real form of a complex simple Lie algebra; and moreover, demonstrate that every $(\bar{\mathfrak{g}}, \bar{\mathfrak{h}})$ can be constructed in the way. In the paper (3) I accomplish the classification of simple irreducible pseudo-Hermitian symmetric spaces without Berger's classification of semisimple affine symmetric spaces. In the paper (4) I give a way of determining the centralizer $C_G(T)$ of an elliptic element $T \in \mathrm{Lie}G$ in a connected real semisimple Lie group G. This way enables one to determine all semisimple, pseudo-Kählerian homogeneous spaces.

(B) *Submanifolds in Riemannian symmetric spaces*: In the papers (5)–(9), (11) and (12), I give sufficient conditions for an isotropic immersion f to be parallel by using inequalities with respect to the mean curvature vector field or codimension, where f is an isotropic immersion from a compact symmetric space of rank one into a real space form. Here, (6) is a joint work with Maeda.

(C) *Harmonic maps*: In paper (1) I and Dorfmeister clarify a relation between potentials for pluriharmonic maps and para-pluriharmonic maps, and interrelate a pluriharmonic (resp. harmonic) map with a para-pluriharmonic (resp. Lorentz harmonic) map. This paper enables one to interrelate CMC-surfaces in $\mathbb{R}^3$ or $\mathbb{R}^3_1$.

References

(1) N. Boumuki and J. Dorfmeister, On a relation between potentials for pluriharmonic maps and para-pluriharmonic maps, The proceedings of the Fourteenth International Workshop on Differential Geometry (ed. Y. -J. Suh), National Institute for Mathematical Sciences, the Korean Mathematical Society and Grassmann Research Group, (2010), 217–233.

(2) T. Noda and N. Boumuki, On relation between pseudo-Hermitian symmetric pairs and para-Hermitian symmetric pairs, Tohoku Math. J. **61**, no.1, (2009), 67–82.

(3) N. Boumuki, The classification of simple irreducible pseudo-Hermitian symmetric spaces: from a viewpoint of elliptic orbits, Mem. Fac. Sci. Eng. Shimane Univ. **41**, (2008), 13–122.

(4) N. Boumuki, Isotropy subalgebras of elliptic orbits in semisimple Lie algebras, and the canonical representatives of pseudo-Hermitian symmetric elliptic orbits, J. Math. Soc. Japan **59**, no.4, (2007), 1135–1177.

(5) N. Boumuki, Isotropic immersions and parallel immersions of Cayley projective plane into a real space form, New Zealand J. Math. **36**, (2007), 139–146.

(6) N. Boumuki and S. Maeda, Study of isotropic immersions, Kyungpook Math. J. **45**, no.3, (2005), 363–394.

(7) N. Boumuki, Isotropic immersions of rank one symmetric spaces into real space forms and mean curvatures, "Contemporary Aspects of Complex Analysis, Differential Geometry and Mathematical Physics (ed. S. Dimiev and K. Sekigawa)," World Scientific Publishing, (2005), pp. 31–40.

(8) N. Boumuki, Isotropic immersions and parallel immersions of space forms into space forms, Tsukuba J. Math. **28**, no.1, (2004), 117–126.

(9) N. Boumuki, Isotropic immersions with low codimension of complex space forms into real space forms, Canadian Math. Bull. **47**, no.4, (2004), 492–503.

(10) N. Boumuki, Remarks on real Lie groups with a complex Lie algebra, Far East J. Math. Sci. **13**, no.2, (2004), 173–179.

(11) N. Boumuki, Isotropic immersions of complex space forms into real space forms and mean curvatures, Bull. Polish Acad. Sci. Math. **52**, no.4, (2004), 431–436.

(12) N. Boumuki, Isotropic immersions with low codimension of space forms into space forms, Mem. Fac. Sci. Eng. Shimane Univ. **37**, (2004), 1–4.

That's all