Research Programme

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Homogeneous special Lagrangian submanifolds in the cotangent bundle of the sphere

It is known that the zero-section of the cotangent bundle of the sphere S^n become a homogeneous special Lagrangian submanifold, but it is not known that this special Lagrangian submanifold has the only sphere. So it is interesting to classify the homogeneous special Lagrangian submanifold.

Low cohomogeneity special Lagrangian submanifolds in the cotangent bundle of the sphere

We classify cohomogeneity one special Lagrangian submanifolds in the cotangent bundle of the sphere S^n invariant under $SO(p) \times SO(n+1-p)$. This special Lagrangian submanifolds was given from a homogeneous hypersurface in the sphere. The theory of homogeneous hypersurfaces in the sphere was established by Hsiang and Lawson, etc. By using the classification we propose to construct the other special Lagrangian submanifolds in the cotangent bundle of the sphere S^n. These special Lagrangian submanifolds was constructed in my papaer [2] and [3]. We plan to classify the all cohomogenitiy one special Lagrangian submanifolds in the cotangent bundle of the sphere S^n and study cohomogenitiy two special Lagrangian submanifolds.

Special Lagrangian submanifolds in the cotangent bundle of CROSS

Stenzel construct Ricci-flat Kähler metric on the cotangent bundle of rank one compact symmetric space (CROSS). Therefore using our method ([1]) it is expected to construct special Lagrangian submanifolds in the cotangent bundle of CROSS except the sphere with respect to Stenzel metric.

The geometry of calibrated submanifolds with special holonomy

It seems that the Riemannian manifolds with the special holonomy group were calibrated submanifolds such as special Lagrangian submanifold of a hyperkähler manifolds, a associative and coassociative submanifolds of G_2 manifolds or a Caylay submanifold of Spin(7) manifolds. We expect to apply our method ([1]) or another method to the study of calibrated submanifolds.