PROGRAM

October 5th, 2018

Opening	**10.00-10.15**
Harmonic almost Hermitian structures, **Johann Davidov**	**10.30-11.15**
Partial integrability of almost complex structures, **Oleg Mushkarov**	**11.30-12.15**
Launch	**12.30-14.00**
Grassmann image of the surfaces in $\mathbb{E}^4$, **Kadri Arslan**	**14.00-14.45**
Kähler manifolds of quasi-constant holomorphic sectional curvature and generalized Sasakian space, **Sinem Güler and Cornelia-Livia Bejan**	**15.00-15.45**
Quasi-Einstein Weyl manifolds, **İlhan Gül**	**16.00-16.45**

Harmonic Almost Hermitian Structures

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Abstract

If a Riemannian manifold admits an almost Hermitian structure (i.e. an almost complex structure compatible with the metric), then it possesses many such structures. Thus it is natural to look for "reasonable" criteria that distinguish some of the almost Hermitian structures on a given Riemannian manifold (M, g). One way to obtain such criteria is to consider the almost Hermitian structures on (M, g) as sections of its twistor bundle $\mathcal{T}$ endowed with the metric h induced by g and the standard metric of the fibre. Motivated by harmonic map theory, C. Wood has suggested considering as "optimal" those almost Hermitian structures $J : (M, g) \to (\mathcal{T}, h)$, which are critical points of the energy functional under variations through sections of $\mathcal{T}$ (these are called harmonic sections). One of the goals of the talk is to discuss geometric conditions on an oriented Riemannian four-manifold under which the Atiyah-Hitchin-Singer and the Eells-Salamon almost complex structures on the (negative) twistor space are harmonic sections. The almost Hermitian structures which are critical points of the energy functional under variations through all maps $M \to \mathcal{T}$ are genuine harmonic maps and another goal of the talk is to present conditions on a four-dimensional almost Hermitian manifold under which the almost complex structure is a harmonic map from the manifold into its (positive) twistor space. The problem when the Atiyah-Hitchin-Singer and the Eells-Salamon almost complex structures determine harmonic maps into the twistor space will also be discussed.

Partial Integrability of Almost Complex Structures

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Abstract

In this talk we will review some old and new results on the problem for local and global existence of holomorphic functions on almost complex manifolds. The following topics will be considered: Existence of holomorphic functions and IJ-bundles, Hypersurfaces in $\mathbb{R}^7$, Nearly Kähler manifolds, Homogeneous almost complex spaces, Partial integrability of the Atiyah-Hitchin-Singer and the Eells-Salamon almost complex structures on twistor spaces. Some open problems will also be discussed.

Grassmann Image of the Surfaces in $\mathbb{E}^4$

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Abstract

The $d-$dimensional plane in Euclidean space $\mathbb{E}^{n+d}$ which passes through the fixed point o in $\mathbb{R}^{n+d}$ is called the point in a Grassmann manifold. Denote a point in $G(d, n+d)$ by p. Now, one can consider the correspondence $\psi : x \to p$. Since the image of ψ is located in a Grassman manifold $G(d, n+d)$, ψ is naturally called a *Grassmann mapping* (in analogy to spherical) and the image $\psi(M^n)$ is called the *Grassmann image* of the submanifold M^n. Other names such as generalized spherical image or tangentially image are used [1].A depth surface is a range image observed from a single view can be represented by a digital graph (*Monge patch*) surface. That is, a depth or range value at a point (s, α) is given by smooth functions $\varphi(s, \alpha)$ and $\omega(s, \alpha)$. If these functions have the parametrizations $\varphi(s, \alpha) = r(s)\cos\alpha$ and $\omega(s, \alpha) = r(s)\sin\alpha$ then the surface is called an *Aminov surface in* $\mathbb{E}^4$ (see, [4]) In the present presentation we give some basic concepts of the Grassmann manifold $G(2, 4)$.Using the Plücker relations it can be seen that the Grassmann manifold $G(2, 4)$ is isometric to product manifold of two unit spheres S_1^2 and S_2^2 (as a smooth manifold). In Section 3 we consider the Grassman image of surface M^2 in $\mathbb{E}^4$ We also give the parametrization of the image of the Grassmann mapping $\psi : M^2 \to G(2, 4)$ for a given surface M^2 in $\mathbb{E}^4$. In the final section we obtained some original results of the Aminov surfaces. Furthermore, we give the necessary and sufficient conditions for the Aminov surfaces whose Grassmann images lay on the product of two spheres.

References

[1] Aminov, Yu. A. *Geometry of Submanifolds.* Gordon & Breach Science Publ., Amsterdam, 2001.

[2] Aminov, Yu. A. *Surfaces in E^4 with a Gaussian curvature coinciding with a Gaussian torsion up to the sign*, Math. Notes, **56**(1994), 1211-1215.

[3] Aminov, Yu. A; V. A. Gorkavyy, A. V. Sviatovets, *On the reconstruction of a two dimensional closed surface in $\mathbb{E}^4$ from a given closed Grassmann image*, Mat. Fiz. Anal. Geom., **11**(2004), $3 - 24$.

[4] Bulca B and Arslan K., *Surfaces Given with the Monge Patch in E 4*, Zh. Mat. Fiz. Anal. Geom., 9(2013), 435–447.

Kähler Manifolds of Quasi-Constant Holomorphic Sectional Curvature and Generalized Sasakian Space

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Abstract

In this talk, two geometric notions, namely Kähler manifolds of quasi-constant holomorphic sectional curvature and generalized Sasakian space forms, are related to each other. Some conditions under which each of these structures induces the other one, are provided here. Several results are obtained on direct products, warped products or hypersurfaces of manifolds and relevant examples are included. Some necessary and sufficient conditions for Einsteinian hypersurfaces are given at the end.
MSC 2010: 53C15, 53C25, 53C40, 53C21.
Keywords: Riemannian curvature, Einstein manifolds, Kähler manifolds, Sasakian space forms, hypersurfaces.

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Quasi-Einstein Weyl Manifolds

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Abstract

In this talk, first, we define quasi-Einstein Weyl manifold which is one of the generalization of Einstein-Weyl manifold. Then, we prove its existence and construct an example. Also, we present some results about quasi-Einstein Weyl Manifolds with semi-symmetric and Ricci-quarter symmetric connections.