XIX
Geometrical Seminar

Book of Abstracts

Zlatibor, 2016.
CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

514(048)

GEOMETRICAL SEMINAR (19; 2016; Zlatibor)
Book of Abstracts / XIX Geometrical Seminar, Zlatibor, August 28 - September 4, 2016;

Organized by University of Kragujevac, Faculty of Science [and] University of Belgrade, Faculty of Mathematics.

- Beograd: Matematički fakultet, 2016

Tiraž 170.


1. Prirodno-matematički fakultet (Kragujevac)
2. Matematički fakultet (Beograd)
   a) Геометрија - Апстракти
On geodesic mappings

Josef Mikeš

*Palacký University Olomouc, Olomouc, CZECH REPUBLIC*
[josef.mikes@upol.cz]

We study fundamental equations of geodesic mappings of manifolds with affine and projective connection onto (pseudo-) Riemannian manifolds with respect to the smoothness class of these geometric objects. We prove that the natural smoothness class of these problems is preserved. We will speak about geodesic mappings of Einstein spaces.

This is a joint work with Irena Hinterleitner.


---

Integrable complex structures on nilpotent Lie algebras

Dmitry Millionshchikov

*Lomonosov Moscow State University and Steklov Institute of RAS, Moscow, RUSSIA*
[million@mech.math.msu.su]

An almost complex structure $J$ on a Lie algebra $\mathfrak{g}$ ($J : \mathfrak{g} \to \mathfrak{g}$ satisfying $J^2 = -1$) is called integrable (Nijenhuis tensor $N(J)$ vanishes) if

$$N(J) = [JX, JY] - [X, Y] - J[JX, Y] - J[X, JY] = 0, \forall X, Y \in \mathfrak{g}.$$ 

An integrable almost complex structure on the tangent Lie algebra $\mathfrak{g}$ of a real simply connected Lie group $G$ defines a left invariant complex structure on $G$. If $G$ is nilpotent and $\Gamma \subset G$ is a cocompact lattice, $J$ defines a complex structure on corresponding nilmanifold $G/\Gamma$.

We plan to discuss the algebraic constraints on the structure of nilpotent Lie algebra $\mathfrak{g}$ which arise because of the presence of an integrable almost complex structure $J$ on $\mathfrak{g}$. 

46
Salamon studied in [4] 6-dimensional nilpotent Lie algebras admitting integrable complex structure. Goze and Remm have shown [1] that a filiform Lie algebra does not admit any integrable almost complex structure, later Remm and Garcia-Vergnolle extended this result to the class of so-called quasi-filiform Lie algebras [2].

**Theorem.** Let $\mathfrak{g}$ be a nilpotent Lie algebra endowed with an integrable complex structure and $\dim \mathfrak{g} \geq 8$. $\mathfrak{g}^k = [\mathfrak{g}, \mathfrak{g}^{k-1}]$ denotes $k$-th ideal of the descending central sequence of the Lie algebra $\mathfrak{g}$. Then we have the following estimates:

$$\text{codim} \mathfrak{g}^4 \geq 5, \text{codim} \mathfrak{g}^6 \geq 8.$$

We will provide examples showing that these estimates are sharp.

**Remark.** For a filiform Lie algebra $\mathfrak{g}$ we have $\text{codim} \mathfrak{g}^4 = 4$, $\text{codim} \mathfrak{g}^6 = 6$.