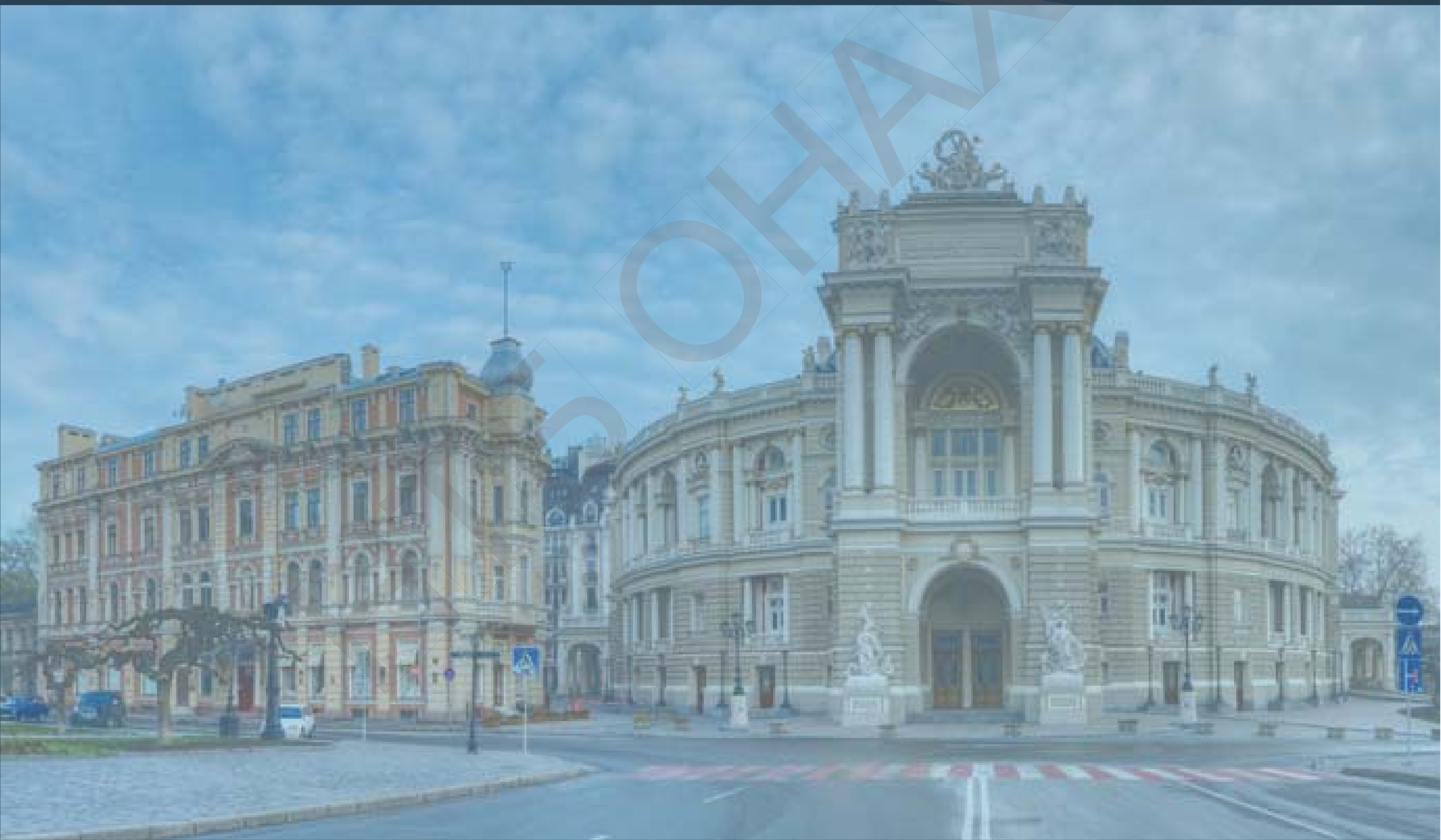
International scientific conference

“Algebraic and Geometric Methods of Analysis”

Book of abstracts



May 28 - June 3, 2019

Odesa, Ukraine

Conference webpage: ***imath.kiev.ua/~topology/conf/agma2019/***

List of topics

- Algebraic methods in geometry
- Differential geometry in the large
- Geometry and topology of differentiable manifolds
- General and algebraic topology
- Dynamical systems and their applications
- Geometric problems in mathematical analysis
- Geometric and topological methods in natural sciences
- History and methodology of teaching in mathematics

Organizers

- The Ministry of Education and Science of Ukraine
- Odesa National Academy of Food Technologies
- The Institute of Mathematics of the National Academy of Sciences of Ukraine
- Odessa I. I. Mechnikov National University
- Taras Shevchenko National University of Kyiv
- The International Geometry Center

Program Committee

Chairman: Prishlyak A.
(*Kyiv, Ukraine*)
Balan V.
(*Bucharest, Romania*)
Banakh T.
(*Lviv, Ukraine*)
Fedchenko Yu.
(*Odesa, Ukraine*)
Fomenko A.
(*Moscow, Russia*)
Fomenko V.
(*Taganrog, Russia*)
Haddad M.
(*Wadi al-Nasara, Syria*)
Karlova O.
(*Chernivtsi, Ukraine*)
Kiosak V.
(*Odessa, Ukraine*)
Kirillov V.
(*Odesa, Ukraine*)
Konovenko N.
(*Odesa, Ukraine*)
Lyubashenko V.
(*Kyiv, Ukraine*)
Maksymenko S.
(*Kyiv, Ukraine*)
Matsumoto K.
(*Yamagata, Japan*)
Mikesh J.
(*Olomouc, Czech Republic*)
Mormul P.
(*Warsaw, Poland*)
Moskaliuk S.
(*Wien, Austria*)
Mykhailyuik V.
(*Chernivtsi, Ukraine*)
Nykyforchyn O.
(*Ivano-Frankivsk, Ukraine*)
Plachta L.
(*Krakov, Poland*)
Pokas S.
(*Odesa, Ukraine*)
Polulyakh E.
(*Kyiv, Ukraine*)
Sabitov I.
(*Moscow, Russia*)
Savchenko A.
(*Kherson, Ukraine*)
Sergeeva A.
(*Odesa, Ukraine*)
Shvets V.
(*Odesa, Ukraine*)
Shelekhov A.
(*Tver, Russia*)
Vlasenko I.
(*Kyiv, Ukraine*)
Volkov V.
(*Odessa, Ukraine*)
Zadorozhnyj V.
(*Odesa, Ukraine*)
Zarichnyi M.
(*Lviv, Ukraine*)

Administrative committee

- Egorov B., chairman, rector of the ONAFT;
- Povarova N., deputy chairman, Pro-rector for scientific work of the ONAFT;
- Mardar M., Pro-rector for scientific-pedagogical work and international communications of the ONAFT;
- Fedosov S., Director of the International Cooperation Center of the ONAFT;
- Svytyy I., Dean of the Faculty of Computer Systems and Automation.

Organizing commitee

Kirillov V.
Konovenko N.
Fedchenko Yu.
Prus A.
Osadchuk E.
Maksymenko S.
Khudenko N.
Cherevko E.

On nonexistence of Kenmotsu structure on Kirichenko–Uskorev-hypersurfaces of Kählerian manifolds

Galina A. Banaru
(Chair of Applied Mathematics, Smolensk State University, Przhevalski str., 4, Smolensk – 214 000, Russian Federation)
E-mail: `mihail.banaru@yahoo.com`

1. The almost contact metric (*acm*-) structure is one of the most important differential-geometrical structures on manifolds. As it is known [2], an almost contact metric structure on a odd-dimensional manifold N is a system $\{\Phi,\ \xi,\ \eta,\ g\}$ of tensor fields on this manifold, where Φ is a tensor of type $(1,1)$, ξ is a vector, η is a covector and $g = \langle\cdot,\ \cdot\rangle$ is a Riemannian metric. Moreover, the following conditions are fulfilled:

$$\eta(\xi) = 1;\ \Phi(\xi) = 0;\ \eta \circ \Phi = 0;\ \Phi^2 = -id + \xi \otimes \eta;$$
$$\langle \Phi X, \Phi Y\rangle = \langle X, Y\rangle - \eta(X)\eta(Y),\ X, Y \in \aleph(N),$$

where $\aleph(N)$ is the module of smooth vector fields on N. As one of the most meaningful and interesting *acm*-structure we mark ut the Kenmotsu structure that is defined by the following condition [2]:

$$\nabla_X(\Phi)Y = \langle \Phi X, Y\rangle\, \xi - \eta(Y)\Phi X, \quad X, Y \in \aleph(N),$$

In [3], V. F. Kirichenko and I. V. Uskorev have introduced a new class of almost contact metric structure. Namely, they have defined the almost contact metric structure with the close contact form as the structures of cosymplectic type. V. F. Kirichenko and I. V. Uskorev have also proved that their structure is invariant under canonical conformal transformations [3].

Evidently, a trivial example of Kirichenko–Uskorev structure is the cosymplectic structure, and as a non-trivial example we can consider the Kenmotsu structure.

2. Now let us consider the *acm*-structure induced on a hypersurface N of a Kählerian manifold M^{2n}, $n \geq 3$. The Cartan structural equations of such *acm*-structure are the following [4]:

$$d\omega^\alpha = \omega^\alpha_\beta \wedge \omega^\beta + i\sigma^\alpha_\beta \omega^\beta \wedge \omega + i\sigma^{\alpha\beta}\omega_\beta \wedge \omega,$$
$$d\omega_\alpha = -\omega^\beta_\alpha \wedge \omega_\beta - i\sigma^\beta_\alpha \omega_\beta \wedge \omega - i\sigma_{\alpha\beta}\omega^\beta \wedge \omega,$$
$$d\omega = -i\sigma^\alpha_\beta\, \omega^\beta \wedge \omega_\alpha + i\sigma_{n\beta}\omega \wedge \omega^\beta - i\sigma^\beta_n \omega \wedge \omega_\beta.$$

Here σ is the second fundamental form of the immersion of N into M^{2n}; $\omega_\alpha = \omega^{\hat{a}}$; $\alpha,\ \beta = 1, \ldots, n-1$; $\hat{a} = a + n$.

Taking into account the results on the matrix of the second fundamental form [5], we obtain the first Theorem.

Theorem 1. *The Cartan structural equations of Kirichenko–Uskorev acm-structure induced on a hypersurface of a Kählerian manifold M^{2n}, $n \geq 3$ are the following:*

$$d\omega^\alpha = \omega^\alpha_\beta \wedge \omega^\beta + i\sigma^{\alpha\beta}\omega_\beta \wedge \omega;$$
$$d\omega_\alpha = -\omega^\beta_\alpha \wedge \omega_\beta - i\sigma_{\alpha\beta}\omega^\beta \wedge \omega;$$
$$d\omega = 0.$$

Comparing these equations with well-known Cartan structural equation of a Kenmotsu structure [2]

$$d\omega^\alpha = \omega^\alpha_\beta \wedge \omega^\beta + \omega \wedge \omega^\alpha;$$
$$d\omega_\alpha = -\omega^\beta_\alpha \wedge \omega_\beta + \omega \wedge \omega_\alpha;$$
$$d\omega = 0,$$

we obtain our second result.

Theorem 2. *Krichenko–Uskorev almost contact metric structure induced on a hypersurface of a Kählerian manifold M^{2n}, $n \geq 3$, cannot be a Kenmotsu structure.*

Note that the presented Theorems develop some results on hypersurfaces of Kählerian manifolds [5], [6].

References

[1] V. F. Kirichenko. *Differential-Geometrical Structures on Manifolds*, Pechatnyi Dom, Odessa, 2003 (in Russian).

[2] K. Kenmotsu. A class of almost contact Riemannian manifolds. *Tôhoku Math. J.*, 24: 93–103, 1972.

[3] V. F. Kirichenko, I. V. Uskorev. Invariants of conformal transformations of almost contact metric structures. *Mathematical Notes*, 84(5):783–794, 2008.

[4] M. B. Banaru, V. F. Kirichenko. Almost contact metric structures on the hypersurface of almost Hermitian manifolds. *Journal of Mathematical Sciences (New York)*, 207(4): 513–537, 2015.

[5] G. A. Banaru. On the almost contact metric structure of cosymplectic type on a hypersurface of a Kähler manifold. *Differ. Geom. Mnogoobr. Figur*, 49: 7–11, 2018 (in Russian).

[6] L. V. Stepanova, G. A. Banaru, M. B. Banaru. On quasi-Sasakian hypersurfaces of Kähler manifolds. *Russian Mathematics*, 60(1): 73–75, 2016.

Зміст