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.

Extensions of semigroups by symmetric inverse semigroups of a bounded finite rank

Oleg Gutik
(Ivan Franko National University of Lviv, Universytetska 1, Lviv, 79000, Ukraine)
E-mail: oleg.gutik@lnu.edu.ua, ovgutik@yahoo.com

Oleksandra Sobol
(Ivan Franko National University of Lviv, Universytetska 1, Lviv, 79000, Ukraine)
E-mail: o.yu.sobol@gmail.com

We study the semigroup extension $\mathscr{I}_\lambda^n(S)$ of a semigroup S by symmetric inverse semigroups of a bounded finite rank.

Definition 1. An subset D of a semigroup S is said to be ω-unstable if D is infinite and $aB \cup Ba \nsubseteq D$ for any $a \in D$ and any infinite subset $B \subseteq D$.

Definition 2. An subset D of a semigroup S is said to be *strongly ω-unstable* if D is infinite and $aB \cup Bb \nsubseteq D$ for any $a, b \in D$ and any infinite subset $B \subseteq D$.

It is obvious that a subset D of a semigroup S is strongly ω-unstable then D is ω-unstable.

Definition 3. An *ideal series* (see, for example, [1]) for a semigroup S is a chain of ideals

$$I_0 \subseteq I_1 \subseteq I_2 \subseteq \cdots \subseteq I_n = S.$$

We call the ideal series *(strongly) tight* if I_0 is a finite set and $D_k = I_k \setminus I_{k-1}$ is an (strongly) ω-unstable subset for each $k = 1, \ldots, n$.

A finite direct product of semigroups with tight ideal series is a semigroup with a tight ideal series and a homomorphic image a semigroup with a tight ideal series with finite preimages is a semigroup with a tight ideal series too [2].

Proposition 4. *Let S be a semigroup which admits a strongly tight ideal series. Then the direct power $(S)^n$ admits a strongly tight ideal series too.*

Theorem 5. *Let λ be an infinite cardinal and n be a positive integer. If S is a finite semigroup then*

$$I_0 = \{0\} \subseteq I_1 = \mathscr{I}_\lambda^1(S) \subseteq I_2 = \mathscr{I}_\lambda^2(S) \subseteq \cdots \subseteq I_n = \mathscr{I}_\lambda^n(S)$$

is the strongly tight ideal series for the semigroup $\mathscr{I}_\lambda^n(S)$.

Theorem 6. *Let S be a semigroup which admits a strongly tight ideal series. Then for every non-zero cardinal λ and any positive integer $n \leqslant \lambda$ the semigroup $\mathscr{I}_\lambda^n(S)$ admits a strongly tight ideal series too.*

Definition 7 ([2])**.** An algebraic semigroup S is called *algebraically complete* in the class of semitopological semigroups $\mathfrak{S}$, if S with any Hausdorff topology τ such that $(S, \tau) \in \mathfrak{S}$ is H-closed in $\mathfrak{S}$.

Theorem 8. *Let S be an inverse semigroup which admits a strongly tight ideal series. Then for every non-zero cardinal λ and any positive integer $n \leqslant \lambda$ the semigroup $\mathscr{I}_\lambda^n(S)$ is algebraically complete in the class of Hausdorff semitopological inverse semigroups with continuous inversion.*

References

[1] A. H. Clifford and G. B. Preston. *The Algebraic Theory of Semigroups*, volume. I of *Amer. Math. Soc. Surveys 7*. Providence, R.I., 1961; volume. II of *Amer. Math. Soc. Surveys 7*. Providence, R.I., 1967.

[2] O. Gutik, J. Lawson, and D. Repovš. Semigroup closures of finite rank symmetric inverse semigroups. *Semigroup Forum*, 78(2): 326–336, 2009.

Зміст