



International Scientific Conference

Algebraic and Geometric Methods of Analysis
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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 and topological methods in natural sciences

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- Taras Shevchenko National University of Kyiv
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Structures of optimal flows on the Boy's and Girl's surfaces

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For a closed oriented surface, the Morse-Smale flows with a minimum number of fixed points (optimal ms-flow) has a single source and sink, is defined by a chord diagram, and can be embedded in R^3 [3]. For the projective plane, the optimal flow has three critical points, but it cannot even be mapped on any immersion in R^3 . The simplest immersions with one triple point are Boy's and Girl's surfaces [1, 2]. Each of the surfaces has a natural stratification (cellular structure). It consists of one 0-strata, three 1-strata (A, B, C) and four 2-strata. In the Boy's surface 2-strata are set by their boundaries: $A, B, C, ABA^{-1}CAC^{-1}BCB^{-1}$. On the Girl's surface, the boundaries of 2-strata are as follows: $A, B, ABA^{-1}CB^{-1}, AC^{-1}C-1BC$.

We describe all possible structures of flows on these surfaces with respect to the homeomorphism (*isotopy*) of the surface using separatrix diagrams and methods of papers [4, 5, 6, 7].

For the flows with one isolated point and a minimum number of separatrices, there are 18 (108) structures per Boy's surface (with one separatrix) and 3 (6) structures per Girl's surface (without separatrices).

For optimal ms-flows on the surfaces as stratified sets, there are 342 (2004) and 534 (1058) flows, respectively. These flows have by 4 fixed points: 0-strata and by one point on each 1-strata.

There are 80 (438) and 118 (230) different structures for the ms-flows on the projective plane that are mapping on these surfaces. The flows have by 3 sources, 3 sinks and 5 saddles (0-strata has triple counting and points from 1-stratas have double counting).

REFERENCES

- [1] Werner Boy, Uber die Curvatura Integra und die Topologie der Geschlossener Flächen *Mathematische Annalen*, 57: 151 – 184, 1903.
- [2] Sue Goodman, Marek Kossowski, Immersions of the projective plane with one triple point *Differential Geometry and Its Applications*, 27: 527–542, 2009.
- [3] Oleksandr Kadubovskij, Classification of Morse-Smale vector fields on 2-manifolds *Visn., Mat. Mekh., Kyiv. Univ. Im. Tarasa Shevchenka*, 14: 85–88, 2005.
- [4] Alexandr Prishlyak. Complete topological invariants of Morse-Smale flows and handle decompositions of 3-manifolds *Journal of Mathematical Sciences*, 144(5): 4492–4499, 2007.
- [5] Alexandr Prishlyak, Andrii Prus, Three-color graph of the Morse flow on a compact surface with boundary *Journal of Mathematical Sciences*, 249: 661–672, 2020.
- [6] Alexandr Prishlyak, Maria Loseva. Optimal Morse-Smale flows with singularities on the boundary of a surface *Journal of Mathematical Sciences*, 243: 279–286, 2019.
- [7] Alexandr Prishlyak, Maria Loseva. Topology of optimal flows with collective dynamics on closed orientable surfaces *Proc. Int. Geom. Cent*, 13(2): 50–67, 2020.

T. Obikhod <i>The role of topological invariants in the study of the early evolution of the Universe</i>	33
I. Ovtsynov <i>O-spheroids in metric and linear normed spaces</i>	34
T. Podousova, N. Vashpanova <i>Infinitesimal deformations of surfaces of negative Gaussian curvature with a stationary Ricci tensor</i>	37
A. Prishlyak <i>Structures of optimal flows on the Boy's and Girl's surfaces</i>	38
V.M. Prokip <i>About solvability of the matrix equation $AX = B$ over Bezout domains</i>	39
N. Saouli, F. Zouyed <i>Regularization Method for a class of inverse problem</i>	42
H. Sinyukova <i>Broadening of some vanishing theorems of global character about holomorphically projective mappings of Kahlerian spaces to the noncompact but complete ones.</i>	44
A. Skryabina, P. Stegantseva <i>The weight of T_0-topologies on n-element set that consistent with close to the discrete topology on $(n - 1)$-element set</i>	45
F. Sokhatsky, I. Fryz <i>On ternary assymetric medial top-quasigroups</i>	46
Andrei Teleman <i>Extension theorems for holomorphic bundles on complex manifolds with boundary</i>	48
J. Ueki <i>Recent progress in Iwasawa theory of knots and links</i>	50
М. Гречнёва, П. Стеганцева <i>Про тип грассманового образу поверхонь з плоскою нормальною зв'язністю простору Мінковського</i>	52
В. Кіосак, Л. Кусік, В. Ісаєв <i>Про існування гедезично симетричних псевдоріманових просторів</i>	53
І. М. Курбатова, М. І. Піструїл <i>Геометричні об'єкти, інваріантні відносно квазі-геодезичних відображень псевдо-ріманових просторів з узагальнено-рекурентною афінорною структурою</i>	54
В. О. Мозель <i>Автоморфні функції та алгебри двовимірних сингулярних інтегральних операторів</i>	55
М. І. Піструїл, І. М. Курбатова <i>Канонічні квазі-геодезичні відображення псевдо-ріманових просторів з рекурентно-параболічною структурою</i>	56
С. І. Покась, А. О. Ніколайчук <i>Геометрія наближення для простору афінної зв'язності</i>	58
А.Соловйов, І.Курбатова, Ю.Хабарова <i>Про 3F-планарні відображення псевдо-ріманових просторів</i>	59
Т. О. Єрьоміна, О. А. Поварова <i>Дослідження властивостей неперервних обмежених розв'язків систем нелінійних різницево-функціональних рівнянь у гіперболічному випадку</i>	60