



International

Scientific

Conference

Algebraic and Geometric Methods of Analysis

May 24-27, 2022, Odesa, Ukraine

## 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

## ORGANIZERS

- Ministry of Education and Science of Ukraine
- Odesa National University of Technology, Ukraine
- Institute of Mathematics of the National Academy of Sciences of Ukraine
- Taras Shevchenko National University of Kyiv
- International Geometry Center
- Kyiv Mathematical Society

## SCIENTIFIC COMMITTEE

### Co-Chairs:

**Maksymenko S.**  
(*Kyiv, Ukraine*)

**Prishlyak A.**  
(*Kyiv, Ukraine*)

**Balan V.**  
(*Bucharest, Romania*)

**Fedchenko Yu.**  
(*Odesa, Ukraine*)

**Matsumoto K.**  
(*Yamagata, Japan*)

**Banakh T.**  
(*Lviv, Ukraine*)

**Karlova O.**  
(*Chernivtsi, Ukraine*)

**Mormul P.**  
(*Warsaw, Poland*)

**Bolotov D.**  
(*Kharkiv, Ukraine*)

**Kiosak V.**  
(*Odesa, Ukraine*)

**Plachta L.**  
(*Krakov, Poland*)

**Cherevko Ye.**  
(*Odesa, Ukraine*)

**Konovenko N.**  
(*Odesa, Ukraine*)

**Polulyakh Ye.**  
(*Kyiv, Ukraine*)

**Savchenko O.**  
(*Kherson, Ukraine*)

## ADMINISTRATIVE COMMITTEE

- Egorov B., chairman, rector of the ONTU;
- Povarova N., deputy chairman, Pro-rector for scientific work of the ONTU;
- Mardar M., Pro-rector for scientific-pedagogical work and international communications of the ONTU;
- Kotlik S., Director of the P.M. Platonov Educational-scientific institute of computer systems and technologies "Industry 4.0";

## ORGANIZING COMMITTEE

Konovenko N.  
Maksymenko S.

Fedchenko Yu.  
Cherevko Ye.

Osadchuk Ye.  
Sergeeva O.

Soroka Yu.

# Morse-Smale flows in the Boy's surface

**Luca Di Beo**

(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine)

*E-mail:* dibeoluca@gmail.com

Morse-Smale (MS) dynamical systems are amongst the simplest possible dynamical systems, with strong restrictions imposed on its critical points. In this thesis, I present a brief history of the development of the theory, along with the introduction of important definitions, theorems and lemmas. Moreover, I investigate MS systems in the Boy's surface ( $P'$ ) with emphasis on optimal ones. A method relying only on topological features has been used in order to classify MS systems in  $P'$ . A review of some topological properties of this space is presented in order to construct the necessary arguments that allowed the discovery of this type of flow in  $P'$ .

At the time this thesis was written, there was no current work in the literature regarding the classification of all optimal MS flows in  $P'$ . Hence, my original contribution to knowledge here is the finding of all 342 optimal MS flows in  $P'$ , the finding of all 80 optimal Projective MS (PMS) flows (Projective MS flows in  $P'$  are those MS flows in  $P'$  that can be extended to MS flow in  $\mathbf{R}P^2$ ) in  $P'$ , and the exposure of a few non-optimal ones, as a preparatory path for future researchers, all up to symmetry.

## Зміст

<b>M. Amram</b> <i>On the algorithm of degenerations and fundamental groups as a tool to understand algebraic surfaces</i>	<b>2</b>
<b>D. Bolotov</b> <i>Foliations on closed three-dimensional Riemannian manifolds with a bounded mean curvature of leaves</i>	<b>3</b>
<b>Enzo Bonacci</b> <i>Topological issues about the 6D ISST in Physics</i>	<b>4</b>
<b>Francisco Bulnes</b> <i>Characterized cycles integration on <math>\mathcal{D}</math>-modules as solutions in <math>\mathbb{L}</math>-holomorphic bundles</i>	<b>5</b>
<b>D. Cheban</b> <i>One-dimensional Monotone Non-autonomous Dynamical Systems and Strange Nonchaotic Attractors</i>	<b>6</b>
<b>Y. Cherevko, V. Berezovski, J. Mikeš, Y. Fedchenko</b> <i>Holomorphically Projective Mappings of Kähler Manifolds Preserving The Generalized Einstein Tensor</i>	<b>8</b>
<b>V. Chernov, R. Sadykov</b> <i>Some questions about virtual Legendrian knots</i>	<b>10</b>
<b>Luca Di Beo</b> <i>Morse-Smale flows in the Boy's surface</i>	<b>11</b>
<b>Yu. Drozd</b> <i>Morita equivalence of non-commutative Noetherian schemes</i>	<b>12</b>
<b>K. Eftekharinasab</b> <i>Some critical point results for Fréchet manifolds</i>	<b>14</b>
<b>V. Fedorchuk, V. Fedorchuk</b> <i>On partial preliminary group classification of some class of <math>(1 + 3)</math>-dimensional Monge-Ampere equations. One-dimensional Galilean Lie algebras.</i>	<b>16</b>
<b>N. Glazunov</b> <i>On packing and lattice packing of Minkowski-Chebyshev balls</i>	<b>18</b>
<b>Omer GOK</b> <i>Unbounded order and norm convergence of some operators on Banach lattices</i>	<b>20</b>
<b>J. Ham, J. Lee</b> <i>An explicit formula for the A-polynomial of the knot with Conway's notation <math>C(2n, 4)</math></i>	<b>21</b>
<b>N. Konovenko</b> <i>The symplectic invariants of 3-webs</i>	<b>23</b>
<b>Yaacov Kopeliovich</b> <i>Solutions to Mumford's second problem on theta functions</i>	<b>25</b>
<b>I. Kuznietsova, Yu. Soroka</b> <i>Geometric interpretation of first Betti numbers of orbits of smooth functions</i>	<b>26</b>
<b>J-P. Magnot</b> <i>On diffeological principal bundles of non-formal pseudo-differential operators over formal ones</i>	<b>28</b>
<b>S. Maksymenko</b> <i>Topological actions of wreath products</i>	<b>29</b>
<b>J-L. Mo</b> <i>The geometrical properties of degenerations of curves and surfaces</i>	<b>30</b>
<b>P. Mormul</b> <i>Nilpotent approximations in the Goursat Monster Tower</i>	<b>32</b>