18th Conference on Applied Mathematics (APLIMAT 2019)

Bratislava, Czech Republic 5 - 7 February 2019

Volume 1 of 2

ISBN: 978-1-5108-8214-0

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2019) by Institute of Mathematics and Physics, Faculty of Mechanical Engineering, Slovak University of Technology in Bratislava All rights reserved.

Printed by Curran Associates, Inc. (2019)

For permission requests, please contact Institute of Mathematics and Physics, Faculty of Mechanical Engineering, Slovak University of Technology in Bratislava at the address below.

Institute of Mathematics and Physics, Faculty of Mechanical Engineering Slovak University of Technology in Bratislava Namestie Slobody 17 812 31 Bratislava 1 Slovak Republic

Phone: +421 2 572 96 111 Fax: +421 2 529 25 749

www.stuba.sk

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: 845-758-0400 Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

CONTENTS

ANTOŠ Karel	
Problem Solving in High School Mathematics	16
BAŠTINEC Jaromír, DIBLÍK Josef, HALFAROVÁ Hana	
Positive Solutions of Nonlinear Discrete Equations	23
DEVECTENE Contains HOCKOVA MAYEDOVA Code	
BEKESIENE Svajone, HOSKOVA-MAYEROVA Sarka	
Automatic Model Building for Binary Logistic Regression by Using SPSS 20 Software	31
Software	31
BEREZOVSKII Vladimir, CHEREVKO Yevhen, NENKA Ruslana, LESHCHENKO Svitlana	
Almost Geodesic Mappings of the Second Type of Spaces with Affine Connection	
onto Two-Symmetric Spaces	41
BÍLKOVÁ Diana	
Challenge in Modeling the Distribution of Economic Data:	
LQ-Moments as a More Robust Option	50
BÍMOVÁ Daniela, PIRKLOVÁ Petra, JEŘÁBKOVÁ Markéta	
	60
Improving Geometric Thinking by Using Planimetric Warm-Ups	60
BOHDAL Róbert, BÁTOROVÁ Martina, FERKO Andrej, FABIÁN Marián, HRABOVSKÝ Michal, LÚČAN Ľubornír, ZABADAL Ľubornír	
Adaptive Scanning of Diverse Heritage Originals Like Synagogue Interior, Empty	
Rare Papers or Herbarium Items from the 19 th Century	72
*	
BRANDI Prirno, SALVADORI Anna	
Digital Photagraphy Math Replaced the Dark Room	83
BRUNETTI Federico Alberto	
The Modulation of Shape. Radiocentric and Reticular and Morphology.	
Some Design Didactic Experiences of Learning by Doing between Analogic	07
Nature and Technical Algorithms	97
BUDÍK Ladislav	
Progress in Heuristic Approach to Stochastic Modelling of Hydrological	
and Meteorological Data	109
	
BUKÁČEK Marek, VACKOVÁ Jana	
Statistical Analysis of Old Kingdom of Egypt	120

BULKOVA Kristina, CERETKOVA Sona	
Zig - Zag Functions in Mathematical Open Ended Problems	
for Functional Thinking Development	134
CÀNDITO Cristina, MELONI Alessandro	
Between the Second and Third Dimension: Isometric Configuration in Art	144
CAPANNA Alessandra, MELE Giampiero	
The 8 and the Taranta an Urban Project "Ad Quadratum" for Melpignano (LE)	156
CARKOVS Jevgenijs, MATVEJEVS Andrejs, RUBENIS Oskars	
Stochastic Approximation of the Logistic System Dynamics	164
CARKOVS Jevgenijs, PAVLENKO Oksana, PETROVA Jekaterina	
Stochastic Modeling for Age Structured Population Growth under Assumption	
of Small Fast Oscillating Perturbations	172
CARLINI Alessandra, TEDESCHINI LALLI Laura	
A Metallic 1928 Geodesic Dome in Rome	182
CATALÁN Raquel G., CELI Valentina, COGOLLUDO José Ignacio, GIL CLEMENTE Elena, LIZASOAIN Inmaculada, MILLÁN GASCA Ana, REGOLIOSI Luigi	
Learning from Children to Improve Primary School Teachers'	
Math-Specific Education	190
CATERINO Alessandro, CEPPITELLI Rita	
Continuous Utility Functions in Mathematical Economic Models	194
CHVALINA Jan, SMETANA Bedřich	
Models of Iterated Artificial Neurons	203
ČIERNIKOVÁ Dominika	
Possibility of Choosing the Open or the Closed Task and Looking	
at the Reasoning of the Chosen Option	213
CONSTANT Jean	
Knowledge Visualization stochastic Processes and Visual Art	219
DIBLÍK Josef, RODKINA Alexandra, ŠMARDA Zdeněk	
Preserving Positivity in Solution of Stochastic Delay Difference	
Equations	233
DLOUHÁ Dagmar, KOZLOVÁ Kateřina	
Knowledge Assessment of Student's High School Mathematics	243

DOLEŽALOVÁ Jarmila, KRČEK Jiří	
New Conception of Admission Examination in Mathematics at	
VŠB-Technical University of Ostrava	253
DOTLAČILOVÁ Petra	
Methods Used for the Calculations of Normal Length of Life	261
DVOŘÁKOVÁ Stanislava, KOTOUČKOVÁ Hana,	
Evaluation of the Equalizing Course of Mathematics at VŠPJ During 2012-2018	266
FAJKUSOVÁ Michaela	
Limit-Point/Limit-Circle Problem: Continuous vs. Discrete Case	275
FERDIÁNOVÁ Věra, BRANNY Michael	
The Constructions of Inscribed Regular Polygons with Compass	283
FERDIÁNOVÁ Věra, PORUBA Jakub	
Construction of Special 3D Models for Monge Projection	292
FERREIRA Manuel Alberto M.	
Laplace Transform Effectiveness in the $M \mid G \mid \infty$ Queue Busy Period	
Probabilistic Study	304
FERREIRA Manuel Alberto M., FILIPE José António	
A Queue Model to Monitor the Conversion from ICEV to EV, HEV and DV in a Scarce Oil Environment	313
FESZTEROVÁ Melánia, HUDEC Michal	
Evaluation of the Ratio of Total Organic Carbon to Total Nitrogen in Soil	
(Kremnické and Štiavnické Mountains)	323
FESZTEROVÁ Melánia, TIRPÁKOVÁ Anna, PORUBCOVÁ Lýdia, ONDRIŠÍK Peter	
The Usage of Statistical Methods for Evaluation of Ammonium Nitrate Content	334
FILIPČUKOVÁ Alena, PŘIBYLOVÁ Lenka	
Flow Charts Application in Education	345
FIŤKA Ivan, ŠIMOVEC Matej, RYBÁŘ Jan, ŠRENKEL Pavol	
Data Warehousing for On-Line Identification	353
FRAILE REY Arantzazu	
Counteracting Detachment and Enhancing Understanding through	
E-Learning in Mathematics with Engineering Students	363

FULIER Jozef	
Some Aspects of Teaching Calculus in Mathematics Teacher Education:	270
The Case of Infinite Series	372
GABKOVÁ Jana, PRÁŠILOVÁ Monika, VELICHOVÁ Daniela,	
Teaching Mathematics to Engineering Students Challenge and Adventure	393
Teaching Wathematics to Engineering Students Chancinge and Neventure	37.
GAŠPARÍK Marek	
Test Design of the PID Controller for Controlling the Electro-Hydraulic Piston	400
GERGELITSOVÁ Šárka, HOLAN Tomáš	
The Importance of Reading Instructions	414
GLIVICKÁ Jana	
Quantum Computing in Computer Science Curricula in the Czech Republic	421
Quantum Computing in Computer Science Curriculu in the Chech Republic	12
GLIVICKÝ Petr	
Metaphors in Teaching Infinity: Limits, Cardinalities, and Nonstandard Models	42
GRAF Vojtěch, DORDA Michal, TEICHMANN Dušan	
Operational Planning of Flight Crews with Minimisation of Transfers of Pilots	
to Airports	430
GROSINGER Patrik, ŠOLEK Peter	
Analog Computer from Modern Components	44:
GUNČAGA Ján, HVORECKÝ Jozef, KOREŇOVÁ Lilla	
Calculator as a Supporting Tool in Mathematics Education at University Level	46
HABALA Petr	
	47
Differential Equations and Numerical Analysis in Bachelor Studies	47
HAJDÚKOVÁ Tatiana, MAREK Jaroslav, MARCINEK Milan	
Fire Units in Slovakia: Analysis of Outgoings	482
The ones in storaida. That you or outgoings	102
HAŠKOVÁ Simona	
The Alternative to the Bayesian Procedure:	
<u>Visualization of the Problem by Means of the Tools of Logic</u>	492
HLAVOVÁ Marta	
Approximation of Helix in CAD/CAM Systems	500
ripproximation of Helix in Cad/Caw Systems	500
HONZÍK Lukáš, FRANK Jan	
Examination of Properties and Important Elements of Binary Operations	
in Future Mathematics Teachers' Education	508

HORSKÝ Richard	
Some Methods How to Solve the Ill Posed Problems	516
HREHOVÁ Stella	
Basic Data Analysis Using the Add-In Power Pivot	525
HRUBÝ Petr, NÁHLÍK Tomáš, SMETANOVÁ Dana	
Mathematical Model of Gear Pump Reaction Forces	531
IANNACE Gino, CIABURRO Giuseppe, ABETI Maurizio	
The Acoustics of the Church of the Holy Family in Salerno (Italy)	539
IŽOLD Roman, ISTENES Igor, JANČO Roland	
Influence of Gyroscopic Effects on Natural Frequencies of Rotating Shaft	552
JAHODOVÁ Monika, KRČEK Jiří, MORÁVKOVÁ Zuzana	
Interactive Tools for Teaching of Numerical Methods for Root-Finding	561
JANČAŘÍK Antonín	
ICT in Mathematics Teacher Education	567
JANOŠOVÁ Markéta, BUDÍKOVÁ Marie	
Advanced Course of Applied Statistics for Anthropology Students:	570
The Teaching Process	573
JERÁBEK Róbert, ÉCSI Ladislav	
A Numerical Study on a Cantilever Using a Thermodynamically	
Consistent Hypoelastic-Plastic Material Model	581
JOVIC Biljana, CVJETIC Milena	
Golden Section: Applications in Domain of Landscape Architecture	590
JURSA Andrej, MARKOŠOVÁ Mária,	
Clique Number Estimate in Uncorrelated Scale-Free Networks	601
KARLOVA Olena, VISNYAI Tomáš	
Remarks on the Determining Sets of Strongly Separately Continuous Functions	
on $l^{\underline{P}}$	609
KARSAI János, CSUMA-KOVÁCS Rita, DUDÁS János, DÁNIELISZ Ágnes,	
MOLNÁR Zsuzsanna, RÖST Gergely	
On the Impact of Vaccination on the Epidemiology of Varicella in Hungary	617
KASPŘÍKOVÁ Nikola	
Generating Text from R. U. R. with Recurrent Neural Networks	628

KLEŠČ Marián	
The Crossing Numbers of Join of Cycles with Graphs of Order Four	634
KLŮFA Jindřich	
Relation between University Study Results in Math and Admission Procedure	642
KMEŤOVÁ Mária, KMEŤ Tibor	
Problem Solving in Dynamic Geometry Environment Using the Intercept Theorem	649
KONEČNÁ Petra, ŠUSTEK Jan	
The Problem of Evaluation in ECTS System and Its Mathematical Solution	657
KONTRIKOVÁ Lenka, TEICHMANN Dušan	
Optimizing Flight Routes	667
KOŠŤÁLEK Josef	
Solving Traveling Salesman Problem by Heuristic Algorithms	679
KOŤÁTKOVÁ STRÁNSKÁ Pavla, KOŠŤÁLEK Josef	
Solving a Deployment Problem with Restricted Areas	685
KOVÁCS Zoltán	
Teaching Inversion Interactively with Webcams Via CindyJS	691
KRIVÁ Zuzana, STAŠOVÁ Oľga	
Speckle Removing Anisotropic Diffusion Based on PDE Models Discretized	
by the Finite Volume Method	700
LAŠŠÁKOVÁ Vladimíra	
Escape Game as an Innovative Tool in Education of Future Mathematics Teachers	715
LIU Luyi, COCCHIARELLA Luigi	
Cross-Scale in Ancient Chinese Landscape	
an Exploration of Topological Thinking in Gardens Spatial Design	724
LORENZI Marcella Giulia	
Spatial Relationships Addressed with Geometrically Exacting	
Constructions: An Illuminating Experience in Math and Art by John Edmark	731
LÖSTER Tomáš	
Simulation of the Behavior of Coefficients for Determining the Number	
of Clusters in Cluster Analysis	742
LUKÁČ Stanislav, GAVALA Tadeáš	
Preparing Future Mathematics Teachers to Apply Inquiry Approaches to Teaching	750

MAGNAGHI-DELFINO Paola, NORANDO Tullia	
Maria Gaetana Agnesi: Suggestions from the Past to New Way to Teach Calculus	761
MAGRONE Paola, TEDESCHINI LALLI Laura	
Mathematics and the Documentation of Intangible Cultural Heritage:	
The Sound of the Trevi Fountain in Rome	772
MALÁ Radka, JENISOVÁ Zita, PORUBSKÁ Mária, BALLOVÁ Dominika	
Design of Experiments in the Laboratory and the Use of Statistical Methods	
for Data Analysis	782
MAREK Patrice, VÁVRA František	
Sports Betting Arbitrage in English Football	793
MATVEJEVS Aleksandrs, DZENITE Ilona	
New Practical Methods of Analysis of Second Order Curves on a Plane	803
MELE Giampiero, MAGNAGHI-DELFINO Paola, NORANDO Tullia	
Geometry and Design Artworks' Reconstruction New Methods or New Tool?	817
MILLÁN GASCA Ana, NERI MACCHIAVERNA Francesca	
The Role of the Stage Presence in Primary Mathematics Teachers Education	829
MINCULETE Nicusor	
About Linear Regression for Two Independent Variables	836
MIŽÁKOVÁ Jana	
Comparison of Different Numerical Laplace Inverse Methods	
for Solving of Differential Equations Systems	844
NÁHLÍK Tomáš	
3D Reconstruction and Volume Measurement of Microscopic Images Using MATLAB	853
NEDVĚDOVÁ Marie, MAREK Jaroslav	
Testing of Birkhoff Hypothesis from Mathematical Aesthetic	859
NÝVLT Ondřej	
Determinants of Start Working Career in Czech Republic with Regression Analysis	867
	807
OTAVOVÁ Miroslava, SÝKOROVÁ Irena	07
Association Between Score from Mid-Term Test and Final Grade	874
PĂCURAR Cristina Maria	_
<u>Pablo Picasso and Bézier Curves</u>	882
PAJEROVÁ Nikola, LINKEOVÁ Ivana	
Similarity of Triangular Meshes Measurement	888

PASÁČKOVÁ Jana	
Analysis of Students of the Study Programme Travel and Tourism	
and Their Mathematical Skills	896
PASÁČKOVÁ Jana	
Oscillation Theorems for Difference Equations of the Fourth Order	904
PĂUN Marius	
Thousands Years in History, One Hundred Years of Modern Romania.	
Landmarks in Cultural Heritage	911
PIETRIKOVÁ Miriam, ORSZÁGHOVÁ Dana	
Comparative Assessment of Factors Determining The decision-Making of Respondents	923
PILICH Kamil, ZAWIŚLAK Stanisław	
Neronal Network Based Training of Virtual Drivers in Car Racing Game	935
PINTO Carla, NICOLA Susana, MENDONÇA Jorge, VELICHOVÁ Daniela	
Project Drive-Math - Analyzing Students' Perceptions of the Improvement	
of Their Social Skills in Active-Learning Courses	945
PIRKLOVÁ Petra, BÍMOVÁ Daniela	
Metric Problems in Monge Projection in GeoGebra	94;
POTŮČEK Radovan	
The Sum of the Series of Reciprocals of the Cubic Polynomials with Triple	
and Double Zero Root	95;
POZDÍLKOVÁ Alena	
Monday Effect on Stock Prices: Testing of Statistical Hypothesis	96:
PRAŽÁK Pavel, VOJKŮVKOVÁ Iva	
Customer's Selection of Mobile Phone Tariff	97:
RICHTARIKOVA Daniela	
Training and Assessment with Respect to Competencies - Forms	989
ŘÍHOVÁ Dana	
Several Products of Financial Mathematics as Linear Difference Equations	995
RIHOVA Elena	
Comparison New Quality Indices for Fuzzy C-Means Clustering	1004
RIHOVA Elena, RIHA David, STROS Michael,	
Factor Analysis in Classifying Personal Sales Factors in Automotive Industry.	
Switzerland Case	100;

RUMANOVÁ Lucia, BOČKOVÁ Veronika	
Design of Non-Routine Problems in Training of Future Primary School	
Teachers with Emphasis on Their Application	1019
RÝPAROVÁ Lenka, KŘÍŽEK Jan, MIKEŠ Josef	
On Fundamental Equations of Rotary Vector Fields	1033
SÁRKÖZI Réka, IVÁNYI Peter, SZÉLL Attila Béla,	
Correlation Between the Static Behaviour of Dome Structures	
and Their Graph Characteristics	1038
SCHREIBEROVÁ Petra, VOLNÝ Petr,	
Geometrical Meaning of Derivatives in GeoGebra	1044
ŠEDIVÁ Blanka, VÁVRA František	
Risk Events for Two Random Processes	1053
SEIBERT Jaroslav, ZAHRÁDKA Jaromír	
The Merrifield-Simmons Index for the Linear Octagonal Chains	105:
ŠIMPACH Ondřej, ŠIMPACHOVÁ PECHROVÁ Marie	
<u>Using DEA to Assess the Differences in Technical Efficiency between</u>	
Farms Managed by Young and Other Farmers	1068
SISÁKOVÁ Andrea	
CLIL Approach in Mathematics	107:
ŠLESAR Peter, JANČO Roland	
Analysis of the Worm Drives and Determination of Contact Pressures	
the Thickness of the Cement Layer	1085
SLOVÁK Juraj, VAŠEK Pavol, MELICHER Markus, MIKULÁŠ Erik	
Position Estimation of the Mobile Robot Using the Kalman Filter	1095
SMETANOVÁ Dana	
Regular Hamiltonian Systems and its Projectability	1107
ŠOVČÍKOVÁ Petronela	
Teaching and Learning Analytic Geometry with Technology	1113
STANGANELLI Anna Maria,	
Some Remarks on the 3-rd Hypersimplex and Applications	111:
STAŠ Michal	
Determining Crossing Number of One Graph of Order Five Using Cyclic Permutations	1129

SZABÓ Tibor, ŽITNÝ Rastislav Some Remarks on Number Theory in High School Education	1138
SZILASSI Lajos, KOVÁCS Zoltán Dynamic Visualization of Hyperbolic Geometry in the Poincaré Disk Model	1145
TAN Shilong, COCCHIARELLA Luigi Impossible Spaces Through Virtual Reality	1158
TOMICZEK Petr Second Order Problem with a Symmetric Nonlinearity	1166
TOMICZKOVÁ Světlana, MILSIMEROVÁ Aneta Motivation of a Student in Geometry Courses at the Faculty of Mechanics	1176
ŤOUPAL Tomáš Nonparametric Kernel Regression Approach	1185
TREMATERRA Amelia, CIABURRO Giuseppe, IANNACE Gino The Effects of the Sound Box Choir Stalls on the Acoustics of the Church of the Certosa of San Martino in Naples	119:
VACKOVÁ Jana, BUKÁČEK Marek The Microscopic Analysis of Velocity-Density Paradigm	1232
VÁCLAVÍKOVÁ Zuzana Maths for Non-Maths Students	1224
VAGASKÁ Alena, GOMBÁR Miroslav Contribution to the Application of Neural Networks to Control the Process of Anodic Oxidation of Aluminium	1229
VÁGOVÁ Renáta Plane, Physical or Dynamic Representations of 3D Objects. Which do You Prefer when Teaching Solid Geometry?	1239
VAJSÁBLOVÁ Margita Geometry and Art on the Bohemiae Rosa and on Bleau's Historical Maps in 17 th Century	1254
VALLO Dusan Geometry of Schwarz Lantern in GeoGebra	1268
VANKÚŠ Peter, DILLINGEROVÁ Monika <u>Common Misconceptions in Algebraic Expressions at University Level</u> and Recommendations to Avoid Them	1277

VANŽUROVÁ Alena	
Homothety Curvature Homogeneous Riemannian Manifolds of Dimension Three	1284
VARGA Marek	
Notes to Indefinite Integrals	128:
VARGOVÁ Michaela, SLAVÍČKOVÁ Mária	
Geometrical Perspective as the Introduction into Limit Process	1294
VELICHOVÁ Daniela, ZÁHONOVÁ Viera	
Interactive Learning Materials for Teaching Constructive Geometry Course	1305
VIGHI Paola	
Abstract Art as Tool to Learn Mathematics Suggestions from a Van Doesburg's Painting	1313
VINTERE Anna	
Development of the Ability to Deal with and Manage Mathematical Language and Tools in the Course "Mathematics for Economists"	131:
ŽDÍMALOVÁ Mária, FECKOVÁ-ŠKRABUĽÁKOVÁ Erika	
Magic with fractals	1329
ZEITHAMER Tomáš R., POSPÍŠIL Jiří	
Space-Time Theory of Retail Gravitation in Economics of Sun-Earth Relationships	1348
ŽÍDEK Arnošt, KOTŮLEK Jan	
Tutorials in the Math Support Centre at the Technical University of Ostrava	1354