

In this issue

Research Article

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[A simple algorithm for GCD of polynomials](#)

Published On: December 23, 2022 | Pages: 193 - 195

Author(s): Pasquale Nardone* and Giorgio Sonnino

Based on the Bezout approach we propose a simple algorithm to determine the gcd of two polynomials that don't need division, like the Euclidean algorithm, or determinant calculations, like the Sylvester matrix algorithm. The algorithm needs only n steps for polynomials of degree n . Formal manipulations give the discriminant or the resultant for any degree without need ...

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[Convolutional modelling of epidemics](#)

Published On: December 03, 2022 | Pages: 180 - 189

Author(s): Alessandro Barducci*

Traditional deterministic modeling of epidemics is usually based on a linear system of differential equations in which compartment transitions are proportional to their population, implicitly assuming an exponential process for leaving a compartment as happens in radioactive decay. Nonetheless, this assumption is quite unrealistic since it permits a class transition s ...

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[The continuity of prime numbers can lead to even continuity \(Relationship with Gold Bach's conjecture\)](#)

Published On: December 02, 2022 | Pages: 171 - 179

Author(s): Xie Ling*

N continuous prime numbers can combine a group of continuous even numbers. If an adjacent prime number is followed, the even number will continue. For example, if we take the prime number 3, we can get an even number 6. If we follow an adjacent prime number 5, we can get even numbers by using 3 and 5: 6, 8 and 10. If a group of continuous prime numbers 3, 5, 7, 11, ...

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[**A new form of discrete real Fourier transform and its potential applications**](#)

Published On: November 24, 2022 | Pages: 160 - 166

Author(s): Grzegorz Plewa*

The paper will present a new version of a real discrete Fourier transform, based on a symmetric frequencies combination of sine and cosine functions. Basic aspects of the construction as well as the potential applications will be discussed. This will include elements of the standard Fourier analysis as well as applications to the class of differential equations in str ...

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[**Sound Energy Harvesting and Converting Electricity \(SEHCE\)**](#)

Published On: October 04, 2022 | Pages: 146 - 149

Author(s): Mervin A Boco*

The research study "Sound Energy Harvesting and Converting Electricity (SEHCE)" aims to create a better and easier way of producing another source of clean and renewable energy through sound. The study did not aim to be compared to other proven sources of electricity such as heat, wind, solar and hydroelectric, instead, it was created to find and explore new ways of p ...

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[**Complex network reveals the spatiotemporal pattern of summer extreme**](#)

[precipitation in Eastern China](#)

Published On: October 04, 2022 | Pages: 140 - 145

Author(s): Aidi Zhang*, Han Zhang, Meng Gao and Xinyi Wang

In this study, complex networks were constructed based on the synchronization of summer extreme precipitation events (SEPEs) in eastern China. Then, a detailed analysis of spatiotemporal patterns of SEPEs and the relationship between SEPEs in eastern China with the eastern Asian monsoon was presented. The results showed that (1) the event synchronization is low in the ...

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[Thermodynamic-induced geometry of self-gravitating systems](#)

Published On: September 16, 2022 | Pages: 130 - 134

Author(s): BI Lev* and AG Zagorodny

A new approach based on the nonequilibrium statistical operator is presented that makes it possible to take into account the inhomogeneous particle distribution and provides obtaining all thermodynamic relations of self-gravitating systems. The equations corresponding to the extremum of the partition function completely reproduce the well-known equations of the genera ...

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[Development online models for automatic speech recognition systems with a low data level](#)

Published On: August 23, 2022 | Pages: 107 - 111

Author(s): Mamyrbayev Zh*, Oralbekova DO*, Alimhan K, Othman M and Zhumazhanov B

Speech recognition is a rapidly growing field in machine learning. Conventional automatic speech recognition systems were built based on independent components, that is an acoustic model, a language model and a vocabulary, which were tuned and trained separately. The acoustic model is used to predict the context-dependent states of phonemes, and the language model and ...

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[Graphene oxide-based waveguides for enhanced self-phase modulation](#)

Published On: August 09, 2022 | Pages: 103 - 106

Author(s): Yuning Zhang*, Jiayang Wu, Yang Qu, Linnan Jia, Baohua Jia and David Moss

The enhanced self-phase modulation (SPM) in silicon nitride (Si₃N₄) and silicon (Si) waveguides integrated with graphene oxide (GO) films is experimentally demonstrated. By using both picosecond and femtosecond optical pulses, we observe significant spectral broadening in the waveguides due to the high Kerr nonlinearity of GO films. The maximum broadening factors of u ...

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[Precontinuity and applications](#)

Published On: July 13, 2022 | Pages: 086 - 094

Author(s): Janusz Matkowski*

In this note, a map f acting between metric (or topological) spaces is referred to be pre-continuous at a point x if, for some sequence of points different from x and converging to x , the sequence converges to (section 2, Definition 1). ...

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[Changchun SLR data analysis using different techniques](#)

Published On: July 07, 2022 | Pages: 074 - 080

Author(s): Susan W Samwel, Zhipeng Liang, Yousry S Hanna, Adel T Roman, Xingwei Han and Makram Ibrahim*

The aim of the present study is to investigate three different techniques for fitting the SLR data observed from the Changchun observatory in China which is characterized by its huge amount of data points and to examine which of the three techniques is more proper for fitting such kind of data. The first technique is the interpolation using the Chebyshev polynomial fo ...

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Review Article

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[Surface energy for nanowire](#)

Published On: July 08, 2022 | Pages: 081 - 085

Author(s): Serghei A Baranov

The theory of surface phenomena in the production of micro-and nanocylinder for important cases is considered. Analytical solution to Gibbs–Tolman–Koenig–Buff equation for nanowire surface is given. Analytical solutions to equations for case the cylindrical surface for the linear and nonlinear Van der Waals theory are analyzed. But for a nonlinear theory, this corresp ...

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Short Communication

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[Importance of atomic physics in verification of experimental results and diagnostics of solar and astrophysical observations](#)

Published On: December 16, 2022 | Pages: 190 - 192

Author(s): Anand K Bhatia*

Accurate results are needed to confirm the experimental results of various atomic processes and analyze the solar and astrophysical observations of intensities of emission lines to infer plasma parameters like electron density, electron temperature and element abundance. A number of theories have been developed over the years to calculate phase shifts when electrons a ...

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Literature Review

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[Cooperative investment problem with an authoritative risk determined by Central Bank](#)

Published On: August 30, 2022 | Pages: 112 - 122

Author(s): Anwar Almualim*

In this paper, we are interested to provide an analytic solution for cooperative investment risk with an authoritative risk determined by the central Bank. This problem plays an important role in solving cooperative investment problems in an investment sector such as insurance companies or banks etc and keeping in our mind the effect of a risk determined by the centra ...

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Mini Review

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[Critical behavior and stability problem in a scalar field model](#)

Published On: November 29, 2022 | Pages: 167 - 170

Author(s): Vladimir Rochev*

As shown in the works [1-3], the asymptotic behavior of the propagator in the Euclidean region of momenta for the model of a complex scalar field and a real scalar field with the interaction drastically changes depending on the value of the coupling constant. For small values of the coupling, the propagator of the field behaves asymptotically as free, while in ...

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[Different approaches to system science](#)

Published On: November 24, 2022 | Pages: 157 - 159

Author(s): Svítek Miroslav* and Žák Ladislav

The goal of the paper is to present a new definition of a holistic approach to the description of complex systems including features such as emergent behavior, exaptation, contingency, self-organization, etc. The presented approach is based on concepts such as singularity (internal behavior of a partial system component without any links), duality (analyses of links b ...

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[Solving train scheduling problems as a job shop: A brief review](#)

Published On: November 15, 2022 | Pages: 153 - 156

Author(s): Frank Werner*

An interesting practical problem is the single-track train scheduling problem which can be considered a job shop scheduling problem, namely since the sequence of sections is fixed for a train route, it corresponds to fixed machine routes (technological orders) in a job shop scheduling problem. However, for a train scheduling problem, typically some additional constrai ...

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[Physical contradictions ruling out photonic quantum nonlocality](#)

Published On: October 29, 2022 | Pages: 150 - 152

Author(s): Andre Vatarescu*

A series of physical contradictions can be identified in an opinion article published in December 2015 (A. Aspect, "Closing the Door on Einstein and Bohr's Quantum Debate," Physics 8, 123, 2015) claiming definitive proof of quantum nonlocality based on entangled pairs of photons. For example, experimental results published simultaneously in Physical Review Letters (25 ...

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[Lissajous curves with a finite sum of prime number frequencies](#)

Published On: September 26, 2022 | Pages: 137 - 139

Author(s): Imre Ferenc Barna* and László Mátyás

The Ulam spiral inspired us to calculate and present Lissajous curves where the orthogonally added functions are a finite sum of sinus and cosines functions with consecutive prime number frequencies. ...

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[Weyl conformal symmetry for gravitation and cosmology](#)

Published On: August 02, 2022 | Pages: 100 - 102

Author(s): RK Nesbet*

The novel paradigm of universal conformal symmetry has been found to explain accelerating Hubble expansion, centripetal lensing by dark galactic halos, and observed excessive galactic rotational velocities, without dark matter. ...

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[A tractroid realization of a 2d black hole vacuum](#)

Published On: August 01, 2022 | Pages: 097 - 099

Author(s): Floyd L Williams*

The two-dimensional black hole vacuum obtained from a spatial slice of the BTZ black hole is mapped explicitly to a tractroid surface minus a bounding circle. ...

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Opinion

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[Simple way to calculate neutrino masses](#)

Published On: September 24, 2022 | Pages: 135 - 136

Author(s): Lev I Buravov*

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[The amazing systemic structure of Mathematics](#)

Published On: July 19, 2022 | Pages: 095 - 096

Author(s): Ramon Blanco Sanchez*

Starting with the works of Ludwig von Bertalanffy, the general systems theory went from being applied to biological systems to identifying systemic structures in different natural, technological and social phenomena, even systemic structures are appreciated in different branches of science. ...

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Case Study

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[From Engle & Granger model to Johansen model for a more accurate photovoltaic power output forecast](#)

Published On: September 13, 2022 | Pages: 123 - 129

Author(s): Harry Ramenah*

The French government has recently decided to increase the Photovoltaic (PV) capacities to reach 35GW by 2028 in all french territories, the European territory, and overseas territories such as Reunion Island in the Indian Ocean. However, integrating growing numbers of PV power installations and microgrids onto the grid can result in larger-than-expected fluctuations ...

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