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Transmathematica 2023: The 5th International Conference On Total Systems

James A.D.W. Anderson
james.a.d.w.anderson@btinternet.com
88 Lower Henley Road, Caversham, Reading, England, RG4 5LE

Walter Gomide
waltergomide@yahoo.com
Department of Philosophy
Institute of Humanities and Social Sciences
Federal University of Mato Grosso
Brazil, 78060-900

Tiago S. dos Reis
tiago.reis@ifrj.edu.br
Federal Institute of Education, Science and Technology
of Rio de Janeiro
Brazil, 27215-350

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Abstract

Transmathematica 2023: The 5th International Conference on Total Systems was held online, using Zoom, on 24 July 2023 at 13.45 - 20.00, London time. Edited video recordings have been uploaded to the Transmathematica channel on YouTube. We now present the conference proceedings.

1 Proceedings

Transmathematica 2023: The 5th International Conference on Total Systems was held online, using Zoom, on 24 July 2023 at 13.45 - 20.00, London time. No physical meeting took place in the aftermath of Covid.

1.1 Opening Address

See YouTube for a recording of the Opening Address.

1.1.1 Conference

Participants were welcomed from 13.45 with four talks starting on the hour, followed by a plenary discussion.

Authors who have published a paper in the Transmathematica journal, since the last conference, may speak at the online conference, free of charge. This makes these talks much like a workshop but with a high barrier to entry – speakers must have published a journal paper. In addition, anyone may take part in the plenary discussion.

The next annual conference will be Transmathematica 2025.

1.1.2 Society

The Transmathematica Society has a Society page on the Transmathematica web site. This offers registration, free of charge, as: a reader of the Transmatheamtica journal, discussion on a Discord server, and subscription to the Transmathematica YouTube channel. While the journal and channel continue to attract viewers, discussion on the Discord server is moribund.

1.1.3 Journal

The Transmatheamtica journal has 302 views per month. Last year this was 85 views per month. The method of counting these views has changed but this still represents a doubling of views.

The journal has published 3 papers, an increase on last year's 2 papers.

The acceptance rate is 63%, which is considered low, given that the editors and reviewers encourage authors to rewrite their papers to achieve publication standard.

The journal has a sponsor who will pay 50% of the Article Processing Charge for some authors. Authors are informed of the subsidy following submission.

1.1.4 YouTube Channel

The Transmathematica YouTube channel has 2,700 views per month. Last year this was 250 views per month.

1.2 Jan Bergstra - Accusation Theory

YouTube recording Transmathematica 2023: Bergstra, Accusation Theory.

Jan Bergstra summarises research on Accusation Theory carried out in collaboration with Marcus Düwell. This theory discusses the nature of accusations, as may be made by and against persons, and proposes fair methods for handling accusations.

Straight accusations are considered a normal case for accusations with special accusation types referring to other forms of accusations. Three special accusation types will be considered: anonymous accusations, non-evidential accusations, and self-accusations. Anonymous accusations (AA's) are accusations with an anonymous accuser. We describe the remarkable effects which anonymous accusations may have, and we propose various key properties of anonymous accusations: (i) the viral character of AA's, (ii) the potentially explosive effect of AA's, and (iii) the forensic challenge creation characteristic of AA's. These characteristics suggest, and in may contexts impose, rather restrictive rules of engagement for dealing with AA's. Secondly we describe non-evidential accusations (NEA's). Such accusations do not allow any meaningful form of validation of the body of the accusation. Nevertheless NEA's play a significant role nowadays. Finally we provide some remarks on self-accusations. A self-accusation may also be non-evidential.

Bergstra, J. A. & Düwell, M. (2023). *Special Accusation Types: Anonymous Accusation, Non-evidential Accusation, and Self-Accusation,* Transmathematica. DOI

1.3 Bas van Vlijmen - Aggregation Dynamics

YouTube recording Transmathematica 2023: Vlijmen, Aggregation Dynamics.

Bas van Vlijmen summarises research on Aggregation Dynamics, which deals with common properties of human problems and common properties of human problem solving. The central thesis is that humans are less innovative than we like to think.

Aggregation Dynamics is a generalisation of ecology where organisms are replaced by aggregations. This totalises the notion of the ecology of living things to the ecology of all things. Aggregations are defined recursively: a thing is an aggregation if an already recognised aggregation acts on it accordingly.

The argument begins by problematising human notions of problem and solution. Reflection on this results in hypotheses such as the Innovation Illusion and the Control Illusion. Aggregation Dynamics suggests that behaviour and organisation of aggregations is emergent and largely information-driven. From that basis, the illusions seem plausible.

van Vlijmen, B. (2023). *Aggregation Dynamics: From problems and solutions to a generalized ecology,* Transmathematica. DOI

1.4 James Anderson - Accusations Against Transmathematics

YouTube recording Transmathematica 2023: Anderson, Accusations Against Transmathematics.

James Anderson discusses several false accusations that have been levelled against transmathematics, most notably that transmathematics plagiarised the IEEE 754 Standard for Floating-Point Arithmetic.

Software Engineering relies, to a large extent, on formal software standards and logical means for specifying and verifying computer programs. Among these the IEEE 754 standard for floating-point arithmetic is widely used. We criticise the standard from the standpoint of transreal arithmetic. Transreal arithmetic was derived from projective geometry using a double cover to provide signed infinities on the horizon and nullity at the point of projection. These infinities and nullity have some similarities with IEEE 754 floating-point infinities and NaNs but there are important differences. We explore the differences by analysing the standard at three levels: commentary within the standard, abstract datatypes, and bit patterns. We find that all of the differences are coincident with faults in the standard. Obviously a correct standard would better support the specification, development and testing of numerical software. We discuss how the standard can be corrected, in its own terms, or by adopting transreal arithmetic as its theoretical foundation. We also discuss emulation of transreal arithmetic in IEEE 754 processing systems and address accusations that transreal arithmetic plagiarised the standard.

Anderson, J. (2023). *Transreal Foundation for Floating-Point Arithmetic,* Transmathematica. DOI

1.5 Tiago dos Reis - Transquaternions

YouTube recording Transmathematica 2023: dos Reis, Transquaternions.

Tiago dos Reis discusses the transquaternions that allow quaternions to be divided by zero.

The quaternions extend the complex numbers and are used in physics and engineering. Division of quaternions by zero is not defined, which limits physical theories and engineering applications. We now introduce transquaternions, which totalise the arithmetical operations of quaternion addition, subtraction, multiplication, and both left and right division. In particular, division of quaternions by zero is allowed.

The transquaternions are homeomorphic to the unit hypersphere or glome, including its interior, together with an isolated point. The 4D interior of the hypersphere is made up of the ordinary quaternions. The 3D surface of the hypersphere is made up of the infinite transquaternions, which are produced by dividing non-zero quaternions by zero. The isolated point, that lies outside the 4D space containing the hypersphere, is the transquaternion nullity, which is produced by dividing zero by zero.

Transquaternions are a separable compact complete metric topological space.

Reis, T. S. dos, & Anderson, J. A. (2022). *Transquaternions,* Transmathematica. DOI

1.6 Plenary Discussion

YouTube recording Transmathematica 2023 - Discussion.

The main topics of discussion were: accusations made by and against scientists, software implementations of transreal arithmetic, advantages of different approaches to division by zero, school arithmetic, obstruction of national research.

1.7 Closing Address

YouTube recording Transmathematica 2023 - Closing Address.

James Anderson thanked participants and closed the meeting.