



Cuadernos de Investigación

Publicaciones , ponencias, patentes,
registros y emprendimientos
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Resumen

Esta ponencia se deriva del trabajo de investigación sobre observatorios locales que se ha venido desarrollando como parte del proyecto de Consultoría con el Concejo de Medellín. La ponencia presenta los problemas de participación e inclusión de los observatorios locales en Medellín, en el marco de la problemática más amplia de inclusión de la participación ciudadana.

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PONENCIA NACIONAL

LÓPEZ F., Sonia

Se enseña o se incentiva el análisis del discurso.

En: VI Congreso Nacional de Estudios del Discurso. Universidad de Cartagena. Cartagena de Indias del 13 al 15 de octubre 2010

Resumen

Coherente con el tema Educación y el Discurso, se pretende con esta ponencia motivar una discusión entre los analistas del discurso sobre cómo trabajar en el aula de clase este legado. Es claro que se debe partir del principio de formar analistas antes que sujetos concedores de fórmulas, pero ¿cómo lograrlos?

Son varios los dispositivos que intervienen en el propósito de trabajar una materia de pregrado o posgrado centrada en el Análisis Crítico del Discurso (ACD). Sin embargo, lo advierte Teun Van Dijk, “el ACD no es un método, es una convicción, un compromiso”. En ese sentido, aparece el primer interrogante. Si no es un método, entonces ¿qué se enseña? Si no es un modelo, entonces ¿cómo lograr transmitirlo? Si, en cambio, es una actitud, una convicción, entonces cómo ¿tratarlo en el aula de clase? ¿A partir de ¿qué principios de la enseñanza?

Se intentará dar cuenta de los cinco elementos (los estudiantes, los tipos de discursos a analizar, los docentes, la bibliografía y la metodología) y sus características, que coexisten en el aula de clase de toda materia, pero específicamente, en las relacionadas con el ACD.

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GRUPO DE INVESTIGACIÓN EN LÓGICA Y COMPUTACIÓN

PUBLICACIÓN INTERNACIONAL

AGUDELO, Juan C.

Paraconsistent Machines and their Relation to Quantum Computing.

En: Journal of Logic and Computation, Oxford University Press, noviembre de 2010. doi:10.1093/logcom/exp072.
ISBN: Online ISSN 1465-363X – Print ISSN 0955-792X.
DATOS DE INDEXACIÓN: ISI, SCOPUS.

Abstract

We describe a method to axiomatize computations in deterministic Turing machines (TMs). When applied to computations in non-deterministic TMs, this method may produce contradictory (and therefore trivial) theories, considering classical logic as the underlying logic. By substituting in such theories the underlying logic by a paraconsistent logic we define a new computation model, the paraconsistent Turing machine. This model allows a partial simulation of superposed states of quantum computing. Such a feature allows the definition of paraconsistent algorithms which solve (with some restrictions) the well-known Deutsch's and Deutsch-Jozsa problems. This first model of computation, however, does not adequately represent the notions of entangled states and relative phase, which are key features in quantum computing. In this way, a more sharpened model of paraconsistent TMs is defined, which

better approaches quantum computing features. Finally, we define complexity classes for such models, and establish some relationships with classical complexity classes.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

CARRANZA Richard, and OSPINA G., Juan Dynamic analysis of heat transfer through a fin of constant Cross-sectional area: specified fin tip temperature

Paper no. HT2009-88111 pp. 685-688 (4 pages)
doi:10.1115/HT2009-88111

ASME 2009 Heat Transfer Summer Conference collocated
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Heat Transfer

ISBN: 978-0-7918-4357-4

doi: <http://dx.doi.org/10.1115/HT2009-88111>

ASME Digital Library

Abstract

A dynamic analysis is performed for heat transfer through a fin with constant cross-sectional area and with a specified fin tip temperature. The process starts with a dynamic energy balance around the fin. Laplace transforms and the Bromwich Integral are used to solve analytically the resulting partial differential equation. The final purely analytical solution is compared to the well known steady state solution. The two match exactly as time approaches infinity. Furthermore it is shown that the steady-state and dynamic characteristics of the fin are directly tied to the Biot number.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

CASTAÑO CANO, Davinson

Generalizations in Mathematical Epidemiology: Using Computer Algebra and Intuitive Mechanized Reasoning

En: Machine Learning and Systems Engineering: Lecture
Notes in Electrical Engineering, 2011, Volume 68, 557-568.
ISBN: 978-90-481-9418-6 (Print) 978-90-481-9419-3
(Online)

Datos de indexación: DOI: 10.1007/978-90-481-9419-3_43
– Springer Link <http://www.springerlink.com/content/12128424345q8j67/>

Abstract

We are concerned by imminent future problems caused by biological dangers, here we think of a way to solve them. One of them is analyzing endemic models, for this we make a study supported by Computer Algebra Systems (CAS) and Mechanized Reasoning (MR). Also we show the advantages of the use of “CAS” and “MR” to obtain in that case, an epidemic threshold theorem. We prove a previously obtained theorem for SnIR endemic model. Moreover using “CAS+MR” we obtain a new epidemic threshold theorem for the SnImR epidemic model and for the staged progressive SImR model. Finally we discuss the relevance of the theorems and some future applications.

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PUBLICACIÓN INTERNACIONAL

CASTAÑO CANO, Davinson

Diseases Propagation Analysis Due to Natural Disasters Using Computational Mathematics

En: Proc, SOCIALCOM, pp.1016-1021, 2010 IEEE Second International Conference on Social Computing, 2010.

ISBN: 978-0-7695-4211-9

Datos de indexación: SCOPUS, ISI. [http://doi.](http://doi.ieeeecomputersociety.org/10.1109/SocialCom.2010.151)

[ieeeecomputersociety.org/10.1109/SocialCom.2010.151](http://doi.ieeeecomputersociety.org/10.1109/SocialCom.2010.151)

Abstract

We are concerned by emergency system deficiencies and information absence about vectors that exist in the entire world, where we are vulnerable to the diseases due to natural disasters. Here, we propose a way to begin creating a strong system; making multiples models of human-vector interaction, some of them with control, and we show the helpfulness for improvement of the emergency squads and their actions, in order to save more lives. Besides, we mention some advantages due to the use of computational mathematics. Finally we discuss the relevance of the analysis and some future applications.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

ECHEVERRI CH., Santiago,

Special modulated beams for cylindrical coordinates in anisotropic media using computer algebra

En: Proc. SPIE, Vol. 7684, 76841D (2010);

doi:10.1117/12.849700

Online Publication Date: 29 April 2010. Laser Radar Technology and Applications XV Conference. Tuesday 6 April 2010. Orlando, Florida.

ISSN: 0277-786X

Datos de indexación: ISI WEB OF SCIENCE, SCOPUS, DOI

Link: <http://dx.doi.org/10.1117/12.849700> Indexado:

Metadex. Clasificación C en Colciencias.

Abstract

An extension of the solution for the propagation of modulated beams through homogeneous media in cylindrical coordinates which results in a wave function described by Bessel Beams is the basis for this analysis of modulated beams through non homogeneous media in cylindrical coordinates. By solving the wave equation analytically, including functions that describe the non-homogeneity, and using computer algebra software such as MAPLE©, we formulate new kinds of beams defined by special functions such as Airy, Kummer, Hypergeometric and Heun functions. We also present convergence issues around the axis of propagation and possible applications for these new beams in telecommunication systems.

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Grupo de Lógica y Computación

PUBLICACIÓN Y PONENCIA INTERNACIONAL

LÓPEZ, Juan M.

Hawk-Dove-Bully-Retaliator quantum game CAS aided

En: Proceedings SPIE, Vol 7702, Quantum Information and Computation VIII, Eric J. Donkor; Andrew R. Pirich; Howard E. Brandt, Editors, 77020Y. 16 April 2010. DOI: 10.1117/12.849539. http://spie.org/x648.html?product_id=849539

ISBN: 9780819481665; ISSN: 0277-786X

Datos de indexación: ISI WEB OF SCIENCE, SCOPUS, Clasificación COLCIENCIAS : C.

Abstract

The known Hawk and Dove game is analyzed from quantum mechanics with another two possible behaviors, Bully and Retaliator. The formalism used in the development of the strategies is not Dirac's due to its complex implementation in Computer Algebra System (CAS) but the matrix analysis is proposed. Both are completely alike in the results given, so the matrix method used is not less efficient than Dirac's. The classical game with the four strategies is also described and compared. As results of the quantum game,

are presented pay-offs matrixes for possible players, the density matrix and its relation to quantum information and communication. Applications such as finances and biology are also presented and proposed.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

RODRÍGUEZ G. Sara Elena

Measurement and analysis of a coupled three-particle quantum system

En: Proc. SPIE, Vol 7702, Quantum Information and Computation VIII, Eric J. Donkor; Andrew R. Pirich; Howard E. Brandt, Editors, 77020K; DOI: 10.1117/12.850515; Date: 16 April 2010.

ISBN: 9780819481665; ISSN: 0277-786X

Clasificación COLCIENCIAS : ISI WEB OF SCIENCE, SCOPUS, C. – http://spie.org/x648.html?product_id=850515

Abstract

The intrinsic quantum properties shown in electrons and atoms allow us to explode a non-classic field for the information management. Through the Stern-Gerlach device (SG), the measurement of spin via a momentum is obtained with associated probabilities due to quantum principles. This paper studies the behavior of a three-particle coupled quantum system in which a spin particle is measured by the SG apparatus while the others are not. The response of the spin-1/2 uncharged particle because of the inhomogeneous magnetic field is also analyzed introducing as well non-linear variations of the magnetic field. The system solution will be determined by special functions according to the variation field defined and three cases with Airy, Whittaker and Heun functions will be treated and supported by different simulations using symbolic computation with Maple.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

SUÁREZ D., Hernando Gustavo,

Thermoelasticity analysis of skin tissue with the use of terahertz radiation

En: Proc. SPIE, Vol. 7671, 76710M (2010);
doi:10.1117/12.849537. Online Publication Date: 26 April 2010. Terahertz Physics, Devices, and Systems IV: Advanced Applications in Industry and Defense. Monday 5 April 2010. Orlando, Florida.

ISSN: 0277-786X

Datos de indexación: ISI WEB OF SCIENCE, SCOPUS, DOI Link: <http://dx.doi.org/10.1117/12.849537>. Indexado en Metadex. Clasificación C en Colciencias.

Abstract

When a terahertz laser generator irradiates a person, its skin gives a thermal and thermoelastic response. Solving the partial differential equations of heat conduction propagation in cylindrical coordinates and the dynamical equations of thermoelasticity with the help of special mathematical functions and laplace transformation, I obtained two different functions in dependence of one spatial coordinate and time. These two functions can be used to perform an analysis of the skin's response, and thus will help to differentiate between unhealthy skin tissue and healthy one.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

URIBE PELÁEZ, Simón,

Identification and description of coverage holes in a wireless sensor network using graph theory and homology.

En: Proc. SPIE, Vol. 7706, 77060R (2010);

DOI:10.1117/12.849538

Online Publication Date: 28 April 2010. Conference:

Wireless Sensing, Localization, and Processing. Thursday 8 April 2010. Orlando, Florida.

ISSN: 0277-786X

Datos de indexación: DOI Link: <http://dx.doi.org/10.1117/12.849538>; Metadex, C en Colciencias. ISI.

Abstract

Identifying coverage holes makes an important topic for optimization of quality service for wireless sensor network hosts. This paper introduces a new way to identify and describe how is the network's structure, its number of holes and its components, assuming there's a sensor covering an area where a network communication exists. The simplicial complex method and algebraic graph theory will be applied. Betti numbers and Euler characteristics will be used for a sensor network represented by a simplicial complex, and the Tutte polynomial will be used for describing visual graphs algebraically, for a complete identification.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

VELEZ R., Mario and OSPINA G., Juan, Biomedical Computer Vision Using Computer Algebra: Analysis of a Case of Rhinocerebral Mucormycosis in a Diabetic Boy

En: Image Processing and Communications Challenges 2 , Advances in Intelligent and Soft Computing (AISC), 2010, Volume 84/2010, 279-286, Springer-Verlag Berlin Heidelberg.

<http://www.springerlink.com/content/u421t61032012795/>

ISSN: 1867-5662

Datos de Indexación: ISI Proceedings, DBLP. Ulrich's, SCOPUS, Zentralblatt Math, MetaPress, Springerlink. DOI: 10.1007/978-3-642-16295-4_32

Abstract

Computer algebra is applied to biomedical computer vision. Specifically certain biomedical images resulting from a case of rhinocerebral mucormycosis in a diabetic

boy are analyzed using techniques in computational geometry and in algebraic-geometric topology. We apply convolution and deblurring via diffusion equation from the side of computational geometry and knot theory, graph theory and singular homology from the side of algebraic-geometric topology. Our strategy consists in to represent the biomedical images using algebraic structures in such way that the peculiarities of the images are represented using algebraic complexities. With our strategy we obtain an automatic procedure for the analysis and the diagnostic based on biomedical images.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

VELEZ R., Mario and OSPINA G., Juan, Quantum algorithms for virtual Jones polynomials via Thistlethwaite theorems

En: Proc. SPIE, Vol. 7702, 770206 (2010); Conference: Quantum Information and Computation VIII.

ISSN: 0277-786X

Datos de Indexación: ISI, SCOPUS, SAO-NASA – DOI: 10.1117/12.849776 – http://spie.org/x648.html?product_id=849776

Clasificación COLCIENCIAS : C

Resumen

Recently a quantum algorithm for the Jones polynomial of virtual links was proposed by Kauffman and Dye via the implementation of the virtual braid group in anyonic topological quantum computation when the virtual crossings are considered as generalized swap gates. Also recently, a mathematical method for the computation of the Jones polynomial of a given virtual link in terms of the relative Tutte polynomial of its face (Tait) graph with some suitable variable substitutions was proposed by Diao and Hetyei. The method of Diao and Hetyei is offered as an alternative to the ribbon graph approach according to which the Tutte

polynomial of a given virtual link is computed in terms of the Bollobás- Riordan polynomial of the corresponding ribbon graph. The method of Diao and Hetyei can be considered as an extension of the celebrated Thistlethwaite theorem according to which invariant polynomials for knots and links are derived from invariant polynomials for graphs. Starting from these ideas we propose a quantum algorithm for the Jones polynomial of a given virtual link in terms of the generalized Tutte polynomials by exploiting the Thistlethwaite theorem and the Kauffman algorithm . Our method is claimed as the quantum version of the Diao-Hetyei method. Possible supersymmetric implementations of our algorithm are discussed jointly with its formulations using topological quantum lambda calculus.

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PUBLICACIÓN NACIONAL

HINCAPIÉ P., Doracelly and OSPINA G., Juan, Simulación del nivel de eliminación de sarampión y rubéola según la estratificación e interacción social.

En: Rev. salud pública vol.12 no.1 Bogotá Jan./Feb. 2010

http://www.scielo.unal.edu.co/scielo.php?script=sci_arttext&pid=S0124-00642010000100010&lng=en&nrm=&tlng=es

ISSN: 0124-0064

Indexación: MedLine, SCIELO. SCOPUS.

Clasificación COLCIENCIAS : A1

Resumen

Objetivo Comparar el nivel de eliminación de enfermedades como sarampión y rubéola en población homogénea y heterogénea según la existencia de estratos sociales con interacción entre individuos de estrato social alto y bajo y diversidad en el número promedio de contactos. Métodos Simulaciones del ritmo reproductivo efectivo, derivado de un modelo matemático tipo SIR (Susceptibles Infectados Recuperados), según diferentes ritmos de inmunidad. Se

utilizaron datos de incidencia de sarampión (1980 y 2005) y rubéola (1998 y 2005) de América Latina y el Caribe. Se analizó la interacción entre individuos del estrato social alto y bajo con diferente número promedio de contactos mediante análisis de red aleatoria bipartita. Las simulaciones se ejecutaron en MAPLE 12 (Maplesoft Inc, Ontario Canada). Resultados En la población socialmente homogénea se reprodujo el avance en la eliminación de ambas enfermedades entre los dos periodos de tiempo. En el estrato alto y bajo, se lograría la eliminación en sarampión (2005) pero en rubéola (2005) sólo se lograría si hay alto ritmo de inmunidad en el estrato bajo. Si varía el número promedio de contactos habituales, no se lograría la eliminación de rubéola ni con un ritmo de inmunidad de 95 %. Conclusión El seguimiento del nivel de eliminación de enfermedades como sarampión y rubéola demanda la consideración de la situación socioeconómica y del patrón de interacción de la población. Especial atención se debe prestar a comunidades con diversidad en el número promedio de contactos en espacios confinados como comunidades desplazadas, carcelarias, educativas, hospitalarias, etc.

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PUBLICACIÓN NACIONAL

SIERRA ARISTIZÁBAL, Manuel

Libro: Lógica básica para la verdad aristotélica.

En: Fondo Editorial Universidad EAFIT, Medellín, 210 p.

ISBN: 978-958-720-061-4, 2010.

Resumen

En este trabajo se construyen sistemas deductivos que incluyen operadores que pueden ser interpretados como “ser verdadero” y como “ser falso”, de tal manera que los llamados “enunciados mal fundados” puedan ser lógicamente tratados sin que esto implique la destrucción del sistema deductivo. Los sistemas construidos generalizan la lógica

clásica de tal manera que la interpretación canónica de algunos admita las lecturas de “enunciado mal fundado”, “enunciado verdadero”, “enunciado falso”, y, además, en alguno de los sistemas, se caracterice la definición de verdad aristotélica.

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PUBLICACIÓN NACIONAL

SIERRA ARISTIZÁBAL, Manuel

Libro: Argumentación deductiva.

En: Fondo Editorial Universidad EAFIT, Medellín, 256 p.
ISBN: 978-958-720-054-6, 2010.

Resumen

Este trabajo se encuentra orientado hacia la argumentación deductiva. Se enfatiza la presentación visual con diagramas, y se utilizan los árboles de forzamiento semántico como herramienta integradora de los aspectos deductivos, semánticos y argumentativos.

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GRUPO DE INVESTIGACIÓN EN ÓPTICA APLICADA

PUBLICACIÓN Y PONENCIA INTERNACIONAL

BETANCUR R., José Alejandro

HUD analysis using MAPLE

En: Proc. SPIE, Vol. 7688, 76880J (2010); doi:10.1117/12.849884. Online Publication Date: 5 May 2010. Head- and Helmet-Mounted Displays XV: Design and Applications Conference. Thursday 8 April 2010. Orlando, Florida.

ISSN: 0277-786X (print)

Datos de indexación: <http://dx.doi.org/10.1117/12.849884>.

Indexado: ISI WEB OF SCIENCE, SCOPUS, Metadex.
Clasificación C en Colciencias.

Abstract

This paper describes a Helmet Mounted display (HMD) based on an augmented reality system applied to car technologies, which is considered as a Head Up display (HUD), using the MAPLE software to analyze the system stability during specific environments in order to understand how the optic parameters are affected by the surrounding conditions. The objective of this paper is segmented into two parts, the first one is the recognition of many different optic parameters involved in such systems, which are analyzed using the mixing of a mathematical model and some measurement systems, where the principal idea was to describe the ratios between both aspects; and the second one is the comprehension of how all those parameters are related with the human perception; I found that parameters like FOV(Field Of View), eye relief and MTF (Modulation Transfer Function) are directly related with the image size, and contrast threshold, additionally I conclude that the effectiveness of the system is determined by the optic elements used and the system array of lens, finally I found some lens structure that could reduce the aberration amounts present in this kind of systems; all these considerations are focused on the developing of a car gadget, but the application of this knowledge is unlimited in optic systems.

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PUBLICACIÓN Y PONENCIA INTERNACIONAL

SIERRA SOSA, Daniel Esteban; Ángel TORO, Luciano Alberto

Digital Optics Tool for Multi-Purpose Experimental Applications

En: The 3rd International Multi-conference on Engineering and Technological Innovation, Orlando-Florida, June 29th to July 2nd 2010. Proceedings, Vol II. ISBN: 978-1-936338-03-0 (print)