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VAN DER POL TYPE PHENOMENA, A STUDY OF OPTIMALITY

Nina DRĂGOESCU (CAZACU)

Abstract. This paper contains an example of Bernoulli equation which can be used in order to determine the optimal solution for dynamic smooth linear systems, according to R.E. Kalman, P.L.Falb and M.A. Arbib theory, particularly, for the dynamical system of the Van der Pol phenomena.

Keywords: optimal, Van der Pol, flowers.

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A SIMPLIFIED ALTERNATIVE TO DEVELOP PERIODIC FUNCTIONS IN TRIGONOMETRIC FOURIER SERIES

Malvina BAICA and Mircea CÂRDU

Abstract. In this paper we introduce a new method to mathematically model a periodic function in a simpler and more precise way than to develop it in a trigonometric Fourier series. We accomplish this using a “Transport Function”.

Keywords: Matrix Functions, Transported Matrix Functions, Transport Functions.

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A THEOREM OF EGOROV TYPE FOR SEQUENCES OF SUBMEASURABLE FUZZY METRIC SPACES-VALUED FUNCTIONS

Octavian LIPOVAN

Abstract. In [5] we have studied three types of convergence for fuzzy metric spaces-valued functions sequences, corresponding to the convergence in measure, almost everywhere (a.e.) convergence and almost uniform (a.u.) convergence, used in classical measure theory.

In the present paper, in order to establish some connection among the different types of convergence, using the submeasurability of some maps whose values are in the product-space,

we put in evidence a theorem of Egorov type for the sequences of submeasurable fuzzy metric spaces-valued functions.

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NATURAL OPERATORS ON THE GENERALIZED TANGENT BUNDLE

Adara M. Blaga

Abstract. A generalized almost complex structure \mathbf{J} and a \mathbf{J} -invariant Riemannian metric \mathbf{G} on TM^*M are considered. Properties of natural affine connections on the generalized tangent bundle of an almost Hermitian manifold are established.

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4-SYSTOLIC CUBICAL COMPLEXES ARE CAT(0) SPACES

Ioana-Claudia LAZĂR

Abstract. We investigate the existence of a CAT(0) metric on a finite dimensional standard piecewise Euclidean cubical complex satisfying a combinatorial curvature condition called local 4-largeness. We will show that the star of any cell of a locally 4-large cubical complex is nonpositively curved, whereas any 4-systolic cubical complex is a CAT(0) space. The key step of our proof is to show that the link of any vertex of an 4-large cubical complex is a flag simplicial complex.

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UNIT BALL GRAPH HOMOLOGY

Sorin LUGOJAN

Abstract. Graphs are usually considered as 1-dimensional simplicial complexes, and that limits the dimension of the simplicial homological groups to 1. In the particular case of Unit Ball Graphs it is introduced a type of simplicial complex that renders homological groups whose

maximal dimension equals the dimension of the ambient space. An example of simplicial homology calculation is given.

Keywords: active zone, CW-complex, homology, nerve, simplicial, unit ball graph

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BOUNDARY ADAPTED GLP IN A SWIRLING FLOW STABILITY PROBLEM

Florica Ioana DRAGOMIRESCU and Diana Alina BISTRIAN

Abstract. The evolution of infinitesimal perturbations superimposed on the basic flow field in a swirling flow stability problem is governed by a first-order system of ODE with various boundary conditions imposed with respect to the values of the azimuthal wavenumber. The system can be rewritten as a single second-order boundary value problem in which for given control parameter setting one can perform a spatial or either a temporal stability analysis. In this paper, the two-point boundary value problem governing the linear stability of the flow is investigated using spectral methods based on generalized Laguerre polynomials.

Keywords: swirling flow, Laguerre polynomials, spectral methods, trailing vortex

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A GROUPOID STRUCTURE ON A VECTOR SPACE

Vasile POPUȚA and Gheorghe IVAN

Abstract. In this paper we introduce the concept of generalized vector groupoid. Several properties of them are established.

Keywords : Ehresman groupoid, generalized vector groupoid

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MODELLING THE DYNAMICS OF A BARGLAZAN TYPE TORQUE CONVERTER

Adriana Sida S. MANEA, Eugen V. DOBANDA, Daniel Catalin P. STROITA

Abstract: The torque converter in open circuit is a complex hydraulic machinery in which the primary hydraulic energy with high flow and low head is transformed through mechanical energy in hydraulic energy with low flow and high head. This paper propose to present the open circuit hydrodynamic torque converter, the characteristic curves and the modelling of the turbine dynamics.

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STUDY OF OPTICAL MODULATORS WITH ROTATING WHEELS: THE EXPERIMENTAL SETUP

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Abstract: The experimental setup we have developed for the study of the modulation functions of optical choppers is presented. The scope of our envisaged experimental studies is to confirm our theoretical findings on the generation of different profiles of ⁹the transmitted signal using various types of chopper wheels. In order to fulfill these investigations several prototype chopper wheels have been manufactured in our laboratory: with ten equidistant windows, with two windows of 90 degrees each, and with windows with circular (inward or outward) margins. We have developed in two previous studies the analysis and the design of this four types of choppers for the case of top-hat (constant distribution) incident light beams. All the relationships between the diameter and position of the section of the beam in the palne of the wheel and the geometry of the device have been considered. In this paper the case of a laser beam focussed in the plane of the rotating wheel is approached, for the two windows wheel. Examples of the modulation function obtained with the developed setup are presented.

Keywords: Optical system for lasers, Aplications of lasers, Optical devices elements, Optical design, Optical scanners, Optical sensors

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NEW APPROACHES IN SIMULATIONS

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Abstract: In the present paper a new analysis type of the theoretical growth and equilibrium forms of TiO_2 was done. These forms were constructed from the calculated attachment energies E_a^{hkl} , which is assumed to be directly proportional to the growth rate for F faces. These forms are simulated for different values of the charges as model I,II and III respectively for normal charges, Matsui charges and van Beest and van Santen charges.

Keywords : Crystal Structure, Electronic structure, surface properties, attachment energies, crystal energies, growth form, equilibrium form

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RADIOMETRIC SCANNING WITH APPLICATIONS IN THE LIGHTING TECHNOLOGY

**Lucian SZANTHO, Corina MNERIE, Ovidiu FALCAN,
Robert BARABAS, Mirela NICOLOV*, Dorin DEMIAN, Virgil-Florin DUMA**

Abstract: We present in this paper a radiometric scanning of the main conference hall of our university, to determine the level of comfort and the economic efficiency of the lighting design used. Two different lighting configurations are studied with regard to the level of illumination provided on the students' desks. A direct link is established between the visual comfort thus produced and the response of the people, given by the places of the hall that are usually preferred by the students. Recommendations are drawn from this experimental analysis and a model of work for this topic is thus provided.

Keywords: photometer, optical scanning, lighting, light scattering in atmospheric optics, physiological optics.

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SIMPLIFIED MATHEMATICAL MODEL OF OPTIMIZED CYLINDRICAL UV REACTOR

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Abstract: This paper studies dose approach in modeling cylindrical UV reactor. UV lamp is arbitrary placed inside the tube either axially or parallel to the central axis. Constant and laminar flow of fluid through reactor is assumed, as well homogeny and isotropic fluid with the linear coefficient of absorption of UV radiation and quasi-infinite lamp and reactor length. Analyzing obtained results of this work, in the analytical form, it is possible to optimize reactor according to the required dose of UV radiation, at the end of a reactor, for the given flow and known range of absorption of fluid in order to make "tailor made" energy efficient reactor.

Keywords: dose, optimization, radiation, reactor, UV

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THE ANYONS' BRAIDING UNCERTAINTY

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Abstract: If we are considering the movement of a certain particle into a plane, the orthogonal group is related to the spectrum of the quantum Hamiltonian enhanced for the plan, rigid rotating objects. The Hamiltonian will remain invariant to the rotations and to the reflections. A very useful method to study such physical systems (when the space of positions has a nontrivial topology, i.e. the circus) is the path integral method. The aim of this paper is to compute the anyons' interchange probability. The departure point is the Laughlin wave function together with the path integral formalism.

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