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Hadamard type Inequalities for Convolution of h-Convex Functions

Gabriela Cristescu
(Arad)

Abstract. Hadamard type inequalities for convolution of two integrable h-convex functions are derived in this paper. They are sharp for the linear functions. Few particular cases give Hadamard-Pachpatte inequalities for convolutions of functions having more generalized convexity properties: Breckner 's convexity, P-functions, Godunova-Levin convexity, classical convexity.

Key Words: convex function, convolution, h-convex function, s-convex function, Hadamard inequality
MSC 2000: 26D15, 26D10

1 Introduction

Let us consider an interval $I \subseteq \mathbb{R}$, $I \neq \emptyset$, a function $f : I \to \mathbb{R}$ and remind that f is said to be convex on I if

$$f(tx + (1-t)y) \leq tf(x) + (1-t)f(y) \tag{1.1}$$

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Algorithms to Solve Exact Prize Collecting Traveling Salesman Problem with Objective Function Depending on a Parameter

Delia Goina
(Bistriţa)

Abstract. In [3], a new type of traveling salesman problem, named *Exact Prize Collecting Traveling Salesman Problem with objective function depending on a parameter*, was studied. In this paper we give some algorithms for solving this type of TSP problems.

Key Words: traveling salesman problem, greedy algorithms, exact algorithms
MSC 2000: 90C10, 90C35

1 Introduction

In [3], a new type of traveling salesman problem, named *Exact Prize Collecting Traveling Salesman Problem with objective function depending on a parameter* and denoted by EPCTSPOP, was studied. A traveling salesman

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Converse Duality for a New Fenchel Dual Problem in Finite Dimensional Vector Optimization

Anca Grad
(Cluj-Napoca)

Abstract. In this article we state and prove a direct converse duality theorem for a new Fenchel dual problem in finite dimensional vector optimization.

Key Words: conjugate functions; Fenchel duality; vector optimization; Pareto-efficient solutions; converse duality.
MSC 2000: 90C25, 46A20, 90C51, 90C46

1 Introduction

A new Fenchel dual problem in finite dimensional vector optimization was introduced by Boţ, Dumitru(Grad) and Wanka in [1]. For the primal-dual pair of problems the authors proved a weak duality theorem, under some very general assumptions (not even the convexity of the functions and sets involved is necessary), along with a strong duality theorem. In this article we provide a direct converse duality theorem, i.e. a situation when the efficient value and efficient solutions of the dual problem are used in order to characterize the efficient solutions of the primal problem. A similar approach, but for a simpler problem, can be found in [5].

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Inequalities for special means

Daniela Inoan (Cluj-Napoca) Ioan Raşa (Cluj-Napoca)

Abstract. We present new inequalities for means in two arguments and improve some known results in this direction.

Key Words: means in two arguments, inequalities
MSC 2000: 26D15, 26D20

1 Introduction

Inequalities concerning means in two variables are much studied and papers on this subject continue to appear, see for instance [1], [3], [4], [7], [9], [10].

In a previous paper, [2], we extended the definition of a mean introduced by J. Sándor in [5].

Let $0 < a < b$ be fixed. For $t \in [0,1]$, define the mean

$$U_t = U_t(a,b) = \sqrt{((1-t)a+tb)(ta+(1-t)b)}.$$

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On a Constant in the Lower Estimate for Bernstein operators

Radu Păltănea
(Braşov)

Abstract. In this paper we determine an explicit constant, $C = \frac{1}{2\sqrt{2}}$ in the following particular case of the strong inverse inequality: $C\omega_2^{\varphi}\left(\Psi_x, \frac{1}{\sqrt{n}}\right) \leq \|B_n(\Psi_x) - \Psi_x\|$, for $n \in \mathbb{N}$ and $x \in [0,1]$, where B_n denote the Bernstein operators and the functions Ψ_x are given by $\Psi_x(t) = |t - x|$.

MSC 2000: 41A36, 41A10

1 Introduction

Recall some basic notations. For an integer $n \geq 1$, consider the Bernstein operator $B_n : C[0,1] \to C[0,1]$, defined by

$$B_n(f,x) = \sum_{k=0}^{n} f\left(\frac{k}{n}\right) p_{n,k}(x),\ f \in C[0,1],\ x \in [0,1],$$

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Solution of a Polylocal Problem with a Pseudospectral Method

Daniel N. Pop (Sibiu) Radu T. Trîmbiţaş (Cluj-Napoca) Ion Păvăloiu (Cluj-Napoca)

Abstract. Consider the problem: $y''(x) + f(x, y) = 0$, $x \in [0, 1]$, $y(a) = \alpha$, $y(b) = \beta$, $a, b \in (0, 1)$. This is not a two-point boundary value problem since $a, b \in (0, 1)$. It is possible to solve this problem by dividing it into the three problems: a two-point boundary value problem (BVP) on $[a, b]$ and two initial-value problems (IVP), on $[0, a]$ and $[b, 1]$. The aim of this work is to present a solution procedure based on pseudospectral collocation with Chebyshev extreme points combined with a Runge Kutta method. Finally, some numerical examples are given.

Key Words: spectral methods, boundary-value problem, collocation, centrosymmetric matrix

MSC 2000: 65D30, 65N35, 15A18

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Optimization Problems and First Order Approximated Optimization Problems

Emilia Loredana Pop (Cluj-Napoca) Dorel I. Duca (Cluj-Napoca)

Abstract. In this paper, we attach to the optimization problem (P), $(0,1)-\eta-$approximatted optimization problem (AP). We will study the connections between the optimal solutions of Problem (AP), the saddle points of Problem (AP), optimal solutions of Problem (P) and saddle points of Problem (P).

Key Words: optimal solution, saddle point, optimization problem, $(0,1)-\eta-$approximatted optimization problem

MSC 2000: 90C30, 90C26, 90C46

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Nonuniform stability for stochastic differential equations in Hilbert spaces

Diana Stoica (Hunedoara) Mihail Megan (Timişoara)

Abstract. This paper is devoted to the problem of nonuniform exponential stability in mean square for stochastic cocycles generated by stochastic differential equations in infinite-dimensional spaces.

The main results is a variant for the stochastic case of nonuniform stability in mean square of well-known theorem due to R.Datko in [6] for uniform exponential stability, in deterministic case.

Key Words: stochastic differential equations, stochastic cocycles, nonuniform exponential stability in mean square

MSC 2000: Primary 37L55, 93E15; Secundary 60H15

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Computing double integrals on polygonal domains

Maria Gabriela Trîmbiţaş

(Cluj-Napoca)

Abstract. Computing double integrals on arbitrary polygonal domain requires the decomposition of the domain into simpler polygonal regions, for example triangles. This is not a simple task when the domain is not convex or it has holes. Our approach is to combine constrained Delaunay triangulation with an adaptive cubature on a collection of triangles.

1 Introduction

Consider the following problem: compute

$$If := \iint_p f(x)dxdy,$$

with a given tolerance ε, where $f : P \to \mathbb{R}$ is a continuous integrable function and P is a poligonal domain in $\mathbb{R}^2$ (that is a domain whose boundary is a union of polygonal lines. If P can be written as a union of triangles, i.e.

$$P = \bigcup_{k=1}^{n} P_k,$$

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Encryption Systems Based on Multidimensional Matrixes

Aureliu Zgureanu (Chişinău) Sergiu Cataranciuc (Chişinău)

Abstract. This paper involves a comparative analysis of two encryption systems known by works [4], [5] and [6]: a) SCEM system [4], [5] that applies difficulty resolving a system of equations with a high degree and undetermined coefficients, needed to break the system; b) BFS system [6] based on the use of Boolean functions. Each of these systems rely on building specific multidimensional matrix.

1 Introduction

One of the pressing problems of information society is the transport and security storage of information using computer technology through global computer networks. Information security can be and is done using cryptographic methods. Cryptography currently covers a set of protocols, encryption algorithms, cryptographic key handling facilities, etc. To obtain a

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Approximative Solutions for the Equilibrium Problem of a Thermoelastic thin Porous Plate

Remus Daniel Ene (Timişoara) Florica Ioana Dragomirescu (Timişoara)

Abstract. Thermoelastic thin porous plates are widely used in engineering applications as efficient structures. The design of such class of structures however imply a serious investigation of their behavior under thermal and mechanical loading. That is why, existence and uniqueness results concerning the solutions of such problems is a major objective in thermoelasticity theory. In [3] an uniqueness result for the solution of the dynamical problem deduced by the homogenization method in a thermoelastic thin porous plate problem was obtained. Herein, starting with the same physical conditions as in [3] we proceed to the construction of an approximative solution for the equilibrium problem. Some compatibility conditions for the boundary conditions system with respect to the absolute temperature are established. The approximative solution is constructed based on power series expansion of the general solution of the partial differential equations describing the transport by radiation on the upper level of the plate.

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Demographic Behaviour of the Population in the Upper Basin of Bârlad River After 1990

Roxana Hobai
(Iaşi)

Abstract. In the entire country after the events from december 1989, the demographic behaviour of the population passed through numerous and complex changes. The upper basin of Bârlad river, situated in Moldavia, represents a predominant rural areal, with communes belonging to Iaşi, Neamţ and Vaslui counties and one single town, Negreşti. The analyse of numeric evolution of population in 1990-2008 period reveals an increasing trend, opposite to the numeric decline of population of the whole country. The evolution of natality and mortality assured a positive natural balance. Even so, the political, economical and social factors conducts to a future natality decline, which represents the main cause of demographic decline and degradation of population age structure.

Key Words: population, natality, mortality, natural balance

1 Introduction

After 1989, the evolution of population from our country passed through numerous and complex changes. The demographic behaviour of population

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Good Agreement Between Experimental Data and Computational ones Concerning the Binding of Alkaline Cations to TEAC Ionophores

Ştefan Hobai
(Târgu Mureş)

Abstract. In biology there are described some transport systems for alkali cations such as valinomycin, a natural sequestering agent for potassium ions, or gramicidin A, a natural channel system for monovalent cations. The K^+ selectivity of valinomycin is high, this molecule being able to segregate one K^* ion among some thousands Na^+ ions. However, there are not Na^+ high selective transport natural systems able to segregate Na^+ ions among more K^+ ions. Artificial ionophores for alkali cations were developed based on sterical or thermodynamical criteria, a modern class being of calixarenes. In this work are presented information on the influence of structural changes at the level of upper rim of a calix[4]arene amide (p-tetra-*tert*-butyl-N-diethylcarbonyl methoxy-calix[4]arene, shortly TEAC) upon the binding selectivity of some alkali cations. The computational data, obtained using Spartan library, are compared with experimental data obtained in literature. There is a good agreement between the two classes of data.

Key Words: calixarenes, coordination cavity, binding selectivity

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Some Problems Regarding the "Sacred House"

Gheorghe Lazarovici (Cluj-Napoca)
Cornelia-Magda Lazarovici (Cluj-Napoca)

For prehistoric times, our information regarding the sacred house is related with the models of houses, sanctuaries, altars or sacred ovens. The study of these models is very important giving to us information related with the inner arrangements, the use of different structures as well as the rank of the inhabitants; in very few cases we can see what and how was happening in such places. The mentioned models are very diverse: monumental dwelling such as sanctuaries, altars or different type of houses, pit-houses, huts. These models give to us more information completing the archaeological ones, some time very poor that can not support ample explanations.

The oldest three dimensional representation is from Çayönü-Tepesi, (millenium VII B. C.) showing a dwelling with flat roof and crenels, such as fortifications, very similar with the houses at the Neolithic site at Haçilar (VI millennium) both in Turkey.

From oldest prehistoric times, when man was using stone tools, there are monumental sanctuaries with the representation of the hunted animals

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Astronomical Orientations at the Cernica Neolithic Necropolis

Zoia Maxim (Cluj-Napoca)
Iharka Szücs-Csillik (Cluj-Napoca)

Abstract. The paper presents some considerations about the astronomical orientation from the Neolithic Cernica necropolis. Up to date, on the Muntenia territory, this is the greatest necropolis in the Neolithic age, discovered and investigated by Dr Gh. Cantacuzino. This necropolis was found accidentally in 1961 on the occasion of the systematical excavation from Cernica in the Căldăraru village, on the western bank of the Cernica Lake. In the graves from the Cernica cemetery were discovered pearls made of copper ore, the oldest in our country and also in Europe. Astronomically, we calculate the azimuth of the Sun (the angles are measured from the North to East) at the summer and at the winter solstice for Cernica (geographical latitude $44°25'$). We know that the points of sunrise and sunset differ from the years 4600-4200 BC, when the Cernica necropolis is dated. The result of the computer program written in Matlab language is that the Sun describes a solar arc in one year: from 235° (Winter Solstice) to 304° (Summer Solstice) for 4400 BC. Using these mathematical results we can say that at the given period of time, in Cernica there was a practice of a solar-magic: sunrise and sunset were observed within the limits of a burial ritual. From measured skeletons, rates of 90% are

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A Mathematical Approach to Cell Dynamics Before and After Allogeneic Bone Marrow Transplantation

Radu Precup (Cluj-Napoca) Damian Trif (Cluj-Napoca) Marcel-Adrian Serban (Cluj-Napoca)
Andrei Cucuianu (Cluj-Napoca)

Abstract. We shortly survey our recent contributions for a basic theoretical-mathematical understanding of cell dynamics in acute leukemia, before and after allogeneic bone marrow transplantation. Inspired by Dingli-Michor's approach, our theoretical models are given in terms of two- and three-dimensional ordinary differential systems whose parameters take into account essential biological properties, processes and interactions, and are involved in the characterization of normal or abnormal hematopoietic status, in the description of asymptotically stable steady-states and their basins of attraction and of therapeutic pre- and post-transplant strategies

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Comet segmentation by theory of approximation

Nicolae Todor (Cluj-Napoca) Ioana Brie (Cluj-Napoca) Gavril Saplacan (Cluj-Napoca)

Abstract. In computer evaluation of comets coming from single cell gel electrophoresis procedure, from the initial image we must classify the pixels as pixels of nucleus or pixels of background. One of the usual methods is to take a level of color and the pixels which have the color higher than this level are pixels of nucleus. This level is computed generally as the mean of the pixels evidently from the background area under some corrections. In our paper, we present mathematical results when the entire image is approximated by a step function with two levels corresponding to the pixels of nucleus and background. Some results for step functions with more than two levels are also presented.

Key Words: Best approximation, classification, comet assay, DNA damage, single cell gel electrophoresis

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Mathematical Tools for Wind Assessment

Radu Trîmbiţaş (Cluj-Napoca) Teodor Groşan (Cluj-Napoca) Octavian Dan Căpăţînă (Cluj-Napoca)

Abstract. A location is characterized in terms of wind potential by the distribution of wind at different heights above the ground. Wind speed distribution is as concise data (known as generic "time series") about wind speed collected once at ten minutes at least one year. As time series is to buy either or distributions to buy - often need to compare the data for accuracy. We proposed to examine the mathematical tools to extract the distribution coefficients of time series and back starting from a distribution to extract a possible time series. Further relying on the power-speed diagram of a turbine data we extract the estimated annual energy.

Key Words: Parameter estimation, Weibull distribution, Wind energy

1 Introduction

Wind assessment is a task on how difficult on so hard in the aftermath. One must start with local measurements data (time series) acquired for at

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