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MATHEMATICS

PHYSICS

U.P.B. Sci. Bull., Series A, Vol. 70, No. 3, 2008 ISSN 1223-7027

BAYESIAN INFERENCE FOR COPULA MODELS

Mariana CRAIU, Radu V CRAIU

We present a general methodology for performing Bayesian inference on copula models. Here we discuss the case in which each marginal distribution is Weibull or Exponential but the approach can be generalized to other distributions. We solve the computational problem associated with sampling from the posterior distribution using Markov chain Monte Carlo. We illustrate the method with simulated data in order to assess its efficiency.

Key words: Copula models, Posterior distribution, Gamma and Weibull distributions, Bayesian statistics.

BINARY RELATIONS – ADDENDA 1 (KERNEL, RESTRICTIONS AND INDUCING, RELATIONAL MORPHISMS)

Mihai REBENCIUC

This paper(in two parts) contains some addenda to binary relations theory in a background witch is extended by generalized categorical operations – relative to the unregulated category of binary relations $\mathcal{R}el$ associated with the regulate category $\mathcal{S}et$. The first two addenda from this part of the paper refer to the kernel, respectively to the restrictions and the induced relation in arbitrary sets of a binary relation - in connection with Boole algebra operations and generalized categorical operations. The last addendum consists in a hierarchy of relational morphisms in parallel in homogeneous and inhomogeneous cases to witch the notion of (bi)simulation (generalized for inhomogeneous case) is reported - important in concurrency programming.

Keywords: category of relations, relational systems, category of sets.
MSC2000: primary18B10, 08A02; secondary 18B05.

U.P.B. Sci. Bull., Series A, Vol. 70, No. 3, 2008 ISSN 1223-7027

ON THE *-FOLD FUZZY CONTEXTUAL GRAMMARS WITH CHOICE

Irina BUCURESCU, Manuela MĂGUREANU

*One presents a new way of introducing the concept of fuzziness in the structure of the contextual grammars with choice (Marcus), by defining the * -fold contextual grammars with choice. The generative capacity of these grammars is investigated..*

Keywords: Fuzzy languages , contextual grammars.
AMCS Classification : 94D05 , 03E72

EXISTENCE OF SOLUTIONS FOR RANDOM FUNCTIONAL-DIFFERENTIAL INCLUSIONS

Carmina GEORGESCU

This paper is devoted to the study of functional-differential inclusions with memory defined on a separable Banach space and depending in a measurable way on a random parameter. Two existence theorems are obtained through the use of analogous deterministic results and techniques from the theory of measurable multifunctions.

Key words and phrases: functional-differential inclusions with memory, random inclusions, viable solutions, measurable selections.

2000 Mathematics subject classification: 34K99, 49J55, 37L55.

U.P.B. Sci. Bull., Series A, Vol. 70, No. 3, 2008 ISSN 1223-7027

SZEGO'S THEOREM STARTING FROM JENSEN'S THEOREM

Călin Alexe MUREŞAN

Firstly, we will introduce Jensen's theorem and some useful consequences for giving the numbers of the zeros to the analytical complex functions inside the open disc $D(0;r)$. *Then, we will present Szego's Theorem and we will get new evaluation about the number of the real roots of a complex polynomial.*

Keywords: The number of real roots, Jensen's equality, Szego's theorem.

OPTICAL STARK EFFECT IN SEMICONDUCTOR QUANTUM WELLS: A COMPARATIVE STUDY

Ecaterina NICULESCU, Adrian RADU, Anca IORGA

The subband energy levels in finite triangular, parabolic and square GaAs-GaAlAs quantum wells under intense laser field are calculated by using a variational method, in the effective mass approximation. The dependence of the absorption coefficient related to the interband transitions on the laser field amplitude and the geometric shape of the quantum wells is discussed.

Key words: triangular quantum well, parabolic quantum well, square quantum well, laser field, optical absorption.

COMPOUND NUCLEUS FORMATION AND DE-EXCITATION WITH NEUTRONS

Emil PETRESCU, Mihail MIREA

A computer code is realized in order to calculate the neutron transmissions through centrifugal barriers. Two models are used: the

strong interaction model and the cloudy ball one. These models are described and errors appearing in previous publications are eliminated. Results are obtained for U isotopes.

MONTE CARLO COMPUTATION OF THE ENERGY DEPOSITED BY HEAVY CHARGED PARTICLES IN SOFT AND HARD TISSUES

Jamshid SOLTANI-NABIPOUR, Gheorghe CĂTA-DANIL

Understanding in details the nuclear phenomena appearing at the bombardment of the biological tissues with high energy ions poses a challenging problem for nuclear physics due to the complexity of the target and reaction mechanisms involved. Solving this problem has a significant relevance for the refinements of the hadron-therapy techniques in medicine and radioprotection of humans in space travels. In the present study we develop complex numerical Monte Carlo simulations for the interaction of high energy heavy charged particles of potential medical interest with water and calcium targets. We choose these targets as rough models for soft and hard biological tissues, respectively. The computational tool employed in the simulations was FLUKA computer code.

Keywords: Charged hadrons interactions, energy deposition, Bragg curve, Monte Carlo simulations, hadron-therapy

SPECTROSCOPIC STUDY OF THE PLASMAS GENERATED BY NANOSECOND LASER ABLATION OF AL AND CU TARGETS

Constantin NEGUȚU, Mihai STAFE, Sorin S. CIOBANU, Ionuț VLADOIU, Niculae N. PUȘCAȘ

This paper presents an experimental spectroscopic study of the plasmas generated by focusing visible nanosecond laser pulses on Al

and Cu targets in atmospheric air. We used the visible spectrum in order to evaluate the spatial variation of the temperature within the Al plasma plume and to estimate the peak temperature of the Cu plasma plume. The obtained results are in good agreement with other published in the literature.

Keywords: Pulsed laser ablation plasma, Laser-induced plasma spectrometry, Cu and Al emission spectra.