

## МОДЕЛИРОВАНИЕ НАНОРАЗМЕРНЫХ ЭФФЕКТОВ В НАНОКОМПОЗИТАХ И ИХ ПРИМЕНЕНИЕ В ВОЕННОЙ ТЕХНИКЕ

### MODELLING OF NANOSCALE EFFECTS IN NANOPARTICLE-REINFORCED MATERIALS AND MILITARY APPLICATIONS

Maksim KIREITSEU, Vlado KOMPIŠ, David HUI, G. TOMLINSON, L. BOCHKAREVA, S. LURIE

**Abstract:** This research work concentrates on local multi-scale effects of continuum media such as nanoparticle-reinforced composite materials. Local cohesion and adhesion effects at the interfaces are investigated for stress-strain relation on the material interfaces. Block fast multi-pole method was used for numerical prediction of interface nanoscale effects such as advanced dynamics, strength and damping of the materials. Advanced methodology, algorithm, computational technique and 3D simulations of nanomaterials have been developed and tested in automated computer environment. Results of the work will provide a platform for the development and understanding of nanoparticle-reinforced materials that are lightweight, vibration and shock resistant. The outcome of the project is expected to have wide-ranging technical benefits with direct relevance to industry in areas of transportation (aerospace, automotive, maritime), military and civil infrastructure development.

**Keywords:** Modeling, nanoparticle, composite, damping, CAD/CAM, dynamics, computer simulation.

## QUANTUM THEORY BASED ON FUZZY SETS

Ferdinand CHOVANEC, Mária JUREČKOVÁ

**Abstract:** A probability model based on the theory of fuzzy sets is presented. In this model, a difference of comparable fuzzy sets is the primary operation. The idea of a difference of fuzzy sets (fuzzy events) is simple: If we have two comparable events  $a$  and  $b$  ( $a \leq b$ ), then our knowledge on  $a$  and  $b$  entails the complete knowledge of the complement of  $a$  in  $b$ , i. e.,  $b \ominus a$ . This algebraic structure of fuzzy sets is called a difference poset (a D-poset) of fuzzy sets.

Some properties of a lattice-ordered D-poset of fuzzy sets (a D-lattice of fuzzy sets) are presented. An MV-algebra of fuzzy sets (a bold algebra) is characterized in the D-poset of fuzzy sets set-up. The sufficient and necessary conditions for a D-lattice of fuzzy sets to be a bold algebra are given. The basic notions of the quantum logic theory - a state and an observable are defined in D-posets of fuzzy sets.

**Keywords:** A D-poset of fuzzy sets, a D-lattice of fuzzy sets, a bold algebra, a state, an observable.

## FOUNDATIONS OF IMAGE RECOGNITION BY PULSE COUPLED NEURAL NETWORKS

Radoslav FORGÁČ, Igor MOKRIŠ

**Abstract:** The paper is oriented into image recognition by Pulse Coupled Neural Networks (PCNNs). The dimension reduction of image space is realized by vector of features that is created by PCNN from multidimensional image space to low dimensional feature space. This approach can radically reduce the number of features for image recognition.

**Keywords:** Pulse Coupled Neural Network, feature generation, dimension reduction, image recognition.

## AFGANISTAN – FAKTY A SÚVISLOSTI

### AFGHANISTAN – FACTS AND CONNECTIONS

Lubomír ČECH

**Abstract:** Declared ambitious targets of the last NATO summit in Riga concerning mission in Afghanistan and comparison of situation development in this country, five years after fall of Taliban, evoke by some safety specialists (undoubtedly also by informed uninitiated) various questions, answering of which is uneasy and a discussion to it does not obey conformity of current alliance agenda. Aim of the article is to point at historical and social, demographical and social-economy determinants of a future Afghan development with a focus on their epistemological factors. Their knowledge, along with other particularities of Afghan environment, may significantly contribute to fulfilment of ISAF troops tasks. As proven by lines below, it is rather a „long distance run“ than a quick and elegant solution.

**Keyword:** International Security Assistance Force, Province Reconstruction Teams, Islamic Belief, Fundamentalism, Jihad, Tribal Traditions, Economy and Drugs.

## SECURITOLOGY AS A SCIENTIFIC DISCIPLINE. THE CONCEPT OF SAFETY

Leszek Fryderyk KORZENIOWSKI

**Abstract:** The author, on the basis of available publications, carries on the presentation of securitology as the scientific discipline as well as the categories studied within that science, like: security, need value and sense of safety, risk, danger, personality of a manager, etc. Securitology, a new scientific discipline being created, undertakes the research of objective situations as well as needs, values and the sense of safety. As results from the undertaken by the author analysis, the sense of safety in the closest surrounding shapes itself differently from the general scale.

If it can be acknowledged that the research of certain categories has contributed to a marked decrease of loss or even control of threats (for example category of the risk in banking), it also has to be said that the problem of objective category of dangers and the sense of safety still require further research and the exchange of scientific ideas between various science centers from all continents, and especially from Europe.

**Keywords:** Securitology, security, science of safety, new scientific discipline.

## THE POSSIBILITIES OF SIMULATION OF A FIGHTER PLANES FLIGHT DURING THE ATTACK OF AN AIR TARGET

Miroslav JANOŠEK

**Abstract:** In the article there is defined mathematical model to research the possibilities of overflow of the air targets by fighter - interceptor. There are introduced starting conditions for the activity of model and there is also described principle of activities with single parameters for the flight of fighter - interceptor. In another parts there is effected analysis of overflow of air target with usage of simulation model during manoeuvres air fighting. In the end there are presented results of mathematical simulation in form of graphic output from PC and shortly analyzed the possibilities of overflow of air target using the cannon equipment.

**Keywords:** Aircraft, air target, overflow, fighter - interceptor, mathematical model, simulation.

## SECURITY OF TELEWORK

Jaroslava KUBÁTOVÁ

**Abstract:** Telework is widely used in companies nowadays. There are many benefits of telework; however, it is connected with serious cyber security risks as well. But security should not prevent adoption of telework. We have to consider that each organization has different cyber security needs, and there is no single solution to address them all. Nevertheless, there are some general security rules and some general security tools which can follow every company to make its data and networks more secure. Some cyber security threats caused by telework and the easiest but sometimes unkept methods of their prevention are discussed in this article.

**Keywords:** Telework, cyber security, security rules, security tools.

## AKTIVITY KRIMINÁLNYCH SKUPÍN NA ÚZEMÍ SLOVENSKEJ REPUBLIKY CRIME GROUPS ACTIVITIES ON THE SLOVAK REPUBLIC TERRITORY

Miroslav LISOŇ, Jozef METEŇKO

**Abstrakt:** Following the analysis on the theoretical and methodological police science bases, as well as the research results, performed activity in the basic research crime groups on the Slovak territory. The authors give scientific view on possibilities in research and merits of the development of new organize criminal activities and analyze technical methods for problems identification on the basis of research and individual features. Moreover he presents possibilities, which, in fact, exist in the research of concrete criminalistics analyzes methods, and which define current needs of criminalistics and police science theory as well as criminal practice.

**Keywords:** Police, police-security studies, crime groups, activity, police science, criminalistics, determinants, merits, core methods, attributes, structure, police-security activity, police-security research.

## ANALÝZA PROCESU STRATEGICKÉHO MANAŽMENTU STRATEGIC MANAGEMENT PROCESS ANALYSIS

Ján PILLÁR

**Abstract:** Strategic management process is very oft presented not only word-oriented but by visual demonstration with picture. Unfortunately, it is normal that pictures of various authors not correspond with their word descriptions. For this reason reader or student can understand this process wrong. On the basis of analysis this article shown new proposal of strategic management process presented with graphic.

**Keywords:** Strategic management process, analysis, new design, relations of phases.

## SIMPLE DETECTION OF ADAMSITE BASED ON SUBSTITUTION-TYPE REACTIONS

Vladimír PITSCHMANN, Emil HALÁMEK, Zbyněk KOBLIHA

**Abstract:** Simple detection of adamsite (irritating warfare agent) in air is described. Two different methods using detector tubes based on substitution-type reactions were developed. The first method is based on electrophilic reaction of adamsite with sodium nitrite in acidic solution which results in red nitroso or isonitroso derivat. The second method is based on nucleophilic reaction of adamsite with ammonium thiocyanate, affording a yellow product. The detection limit for adamsite in air is 0.5 µg for the first described method and 5 µg for the second. Visual evaluation of detector tubes is based on intensity of color developed on the indication layer.

**Keywords:** Adamsite, detector tubes, sodium nitrite, thiocyanates.

# POŽADAVKY NA ZÁKLADNÍ UŽITNÉ VLASTNOSTI PŘIPRAVOVANÉHO TĚŽKÉHO BOJOVÉHO STEJNOKROJE ARMÁDY ČESKÉ REPUBLIKY

## REQUIREMENTS FOR BASIC MANUFACTURE QUALITIES OF THE CZECH ARMY'S DEVELOPED HEAVY COMBAT UNIFORM

Bedřich SEDLÁK, Petr HARAŠTA

**Abstract:** Part of the results achieved in the project of internal grant agency VGA No 17/2000 is presented in the text. The project reflects the current modernization needs, as well as the needs of interoperability and standardization of military vehicles and materiel with other NATO armies.

One of the project objectives was to propose requirements for a combat uniform for the first quarter of the 21st century, and to specify a time-schedule for the basic structural design of the „Heavy Combat Uniform of the Army of the Czech Republic“.

**Keywords:** Design, interoperability, materiel, modernization, project, qualities, demand factor, standardization, applicable merchandise value, protection-level, uniform, combat dress items required, personal equipment of a soldier, military science, new types of combat operations.