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## **MODELLING OF CMOS AMS 0.35 $\mu\text{m}$ N-DIFFUSION PHOTODIODE BEHAVIOUR**

A. DRAGULINESCU, L. LIZARRAGA, S. MIR, G. SICARD, O. IANCU

*In this paper we present the modelling of the behaviour of a CMOS n-diffusion photodiode that uses a CMOS AMS 0.35  $\mu\text{m}$  process. We simulated with T-CAD tools the behaviour of the photogenerated current and of the dark current of the photodiode and we compared the results with those from a behavioural model of the device (Verilog-A). The results from the two simulations are very similar, and thus the results obtained with the more precise T-CAD simulations confirmed the data from the Verilog-A model.*

**Keywords:** CMOS n-diffusion photodiode, CMOS AMS 0.35  $\mu\text{m}$  process, T-CAD tools, Verilog-A model.

## **DIGITAL SYSTEM FOR OPTICAL INCREMENTAL ENCODER CONNECTION**

Fl. GROFU, Luminita POPESCU

*Whenever mechanical rotary motions have to be monitored, the encoder is the most important interface between the mechanics and the control unit. Encoders transform rotary movement into a sequence of electrical pulses. The connection of the encoders to an automated system is made through a digital system, which is able to detect the increment and direction of rotation. Also, the system has the possibility to connect to a communication system for the data transfer with a central dispatcher.*

**Keywords:** digital system, automatization, incremental encoder.

## VOLTAGE SWITCHING TABLES FOR DIRECT TORQUE CONTROL OF PMSM DRIVE

Mohamed KADJOUJ, Nouredine GOLEA, Med. Hachemi BENBOUZID

*The direct torque control(DTC) is one of the actively researched control which is based on decoupled control of flux and torque. Among all methods of torque control of permanent magnet synchronous motor (PMSM), DTC achieves robust and fast torque response without the need of speed or position sensors, coordinate transformation, PWM pulse generation and current regulators. In fact, this approach proposes a control scheme where the electromagnetic torque and stator flux magnitude are estimated with only stator voltages and currents. The estimation does not depend on motor parameters except for the stator resistance.*

*The paper describes an investigation about the effect of the zero voltage space vectors in the DTC system of PMSM and shows that if using the zero voltages rationally, not only the DTC system can be driven successfully but torque ripple is significantly reduced and performance of the system is improved. The effectiveness of the strategy is analysed by modelling implementation and switching tables specifics for an interior PMSM are derived.*

**Keywords:** DTC, PMSM, Switching tables, Stator flux linkage

## INTERSTRUCTURE - A SOLUTION FOR IMPROVEMENT OF TRANSPORTATION TELECOMMUNICATION APPROACH

F.D. GRAFU

*Based on communication transition toward much more performance for physical media and a better stability from device standardization point of view involved, we shown that the new generation of telecommunication equipments and new management models from transportation area could be merged in **interstructure**. What is new about this concept **interstructure** is that it separate transportation telecommunication area from infrastructure and superstructure and involve this one in a single term so that make it easier to distinguish in practice. In other words, when we discuss about **interstructure** maintenance we exclude from the outset that we operate on the infrastructure component that is placed in a specific area or on the superstructure existing in that particular site.*

*We tackle this subject from the transportation point of view, because in this domain there are specific studies and the differences between infrastructure and superstructure are clearly delimited. The novelty is that the concept are analyzed through delimit a middle area between infrastructure and superstructure and call it **interstructure**, this concept line up behind ITS administrators and in the future could help telecommunication equipment administrators which, for example, design a communication support of a institution using it infrastructure and superstructure for obtain their **interstructure** who they can administræ as an independent entity against the first two.*

**Keywords** : interstructure, Ethernet, transportation, traffic, infrastructure, protocol, communication, standard, network, framework

## LES BASES PHYSIQUES DE L'ENERGETIQUE

D. CIOFLICA, E. POTOLEA

*L'énergétique est une science qui a comme objet d'étude l'exploitation de l'énergie des systèmes physiques: les sources d'énergie, la transmission de l'énergie, les transformations de l'énergie. Les bases physiques de l'énergétique sont représentées par les lois et les principes de la physique pragmatique que nous voulons les exposer.*

*Energetics is a technical-economic science which has as object of study the exploitation of the physical systems' energy: sources of energies, transmission of energy, energy conversions. The physical bases of energetics are the laws and the principles of pragmatic physics which we have exposed.*

**Mots-clé**: physique traditionnelle et pragmatique, énergie, énergétique, grandeurs physiques, loi physiques, unités de mesure.

## MODELE HYBRIDE BASE SUR DES RELIGIONS POUR L'OPERATION OPTIMALE DES RETENUES A USAGES MULTIPLES

R. POPA, B. POPA

*The recent issue of a religion-based evolutionary algorithm (RBEA) has generated the interest for analyzing their capabilities to approach some practical problems from the engineering field. In this paper, it has been selected from literature a relative simple problem of a long term operation for a multipurpose reservoir (where it is solved by dynamic programming, simulated annealing algorithm and swarm particle algorithm). The formulation of this problem on the RBEA context is described and illustrated by a numerical example. By comparing results with those obtained through other methods, one concludes that RBEA is a robust and flexible solving alternative, which enriches the evolutionary methods usable for approaching some nonlinear, great dimension, combinatorial optimization problems.*

*L'apparition très récente d'un algorithme évolutionniste basé sur les religions (AEBR), a provoquée l'intérêt d'analyser ses capacités de résoudre des problèmes pratiques pour les ingénieurs. En cet article, on a choisi comme exemple un problème relativement simple d'optimisation à long terme d'une retenue à usages multiples résolu par d'autres méthodes (la programmation dynamique, l'algorithme de l'endurcissement simulé, l'algorithme de l'essaim de particules) dans la littérature. Ce problème est décrit et formulé dans le contexte de l'AEBR. Par la comparaison des résultats avec celles obtenus par d'autres méthodes, il résulte que l'AEBR est une alternative robuste et flexible de résolution, qui enrichit la gamme de méthodes évolutionnistes étant possible d'être utilisée en ce genre de problèmes d'optimisation combinatoire, non linéaire et de grand dimension s.*

**Mots clef:** algorithme évolutionniste basé sur les religions, retenue à usages multiples, l'optimisation

## DESIGN PROCEDURE FOR THE INPUT/OUTPUT FILTER CIRCUITS USED FOR SINGLE PHASE AC CHOPPERS

D.OLARU, D.FLORICAU

*The harmonic filtering problem is more and more important for the modern power delivery networks. The low-pass filters synthesis, when the LC cells are present both at input and at output, has specific features, and a classic approach isn't valid. The paper presents a combined methodology, based on certain imposed criteria. The working hypotheses simplification, taking into account the technical aspects, enables to derive simple equations for the component evaluation. To prove the presented method, after the problem solving with the MathCAD interpreter, a PSpice simulation was used for a model circuit. The generality of the implied methods yields promising results for different static converters with more complex topologies.*

**Keywords:** low-pass-filter synthesis, static-converter, harmonic pollution.

## TRAINING SPIKING NEURONS WITH ISOLATED SPIKES CODING

B. PAVALOIU, P. CRISTEA

*The paper presents the structure and function of spiking neural networks. There are described the main models, as well as the modalities of data representation and processing. For an "Integrate-and-Fire" neuron, it is used a timing coding of input data. It is described a method of supervised training for this type of neuron and it is proved that an equivalent perceptron/ perceptron training rule can be found.*

**Keywords:** spiking neural network, integrate-and-fire, spiking response model, coding, timing coding, supervised training, perceptron training rule

## **EVOLUTIONARY LEARNING OF A FUZZY CONTROLLER FOR A MOBILE ROBOT**

FADI HALAL, I. DUMITRACHE

*Fuzzy control systems, neural networks and genetic algorithms can be cooperatively used for designing robot control systems. This paper presents a hybrid geno-fuzzy system based on a genetic algorithm that optimizes the membership functions and the rule structure of a fuzzy controller. The robot is a Khepera mobile robot that has to follow a track and find a target. The presented results demonstrate the validity of such a hybrid approach.*

**Keywords:** geno-fuzzy system, fuzzy logic, genetic algorithm, mobile robot.

## **SMART PROCESS MONITORING USING LABVIEW ENVIRONMENT**

M. St. Vlad, V. Sgârciu

*This paper aims to proof the concept of remote control of sensors, for automated monitoring of industrial processes. Using National Instrument LabVIEW framework, it was realized an application that monitors/commands using the same server, different industrial processes.*

**Keywords:** monitoring, remote command, remote control, DataSocket communication.

## **INTERNET BASED REMOTE CONTROL OF AN AIR-FLOW AND TEMPERATURE PLANT**

C. PETRESCU, C. LUPU, I. MATEI

*This paper describes the setup behind the remote control of an air-stream and temperature didactical control platform. Issues related to the hardware and software architecture and configuration for remote control of the experimental platform using Internet as communication network are emphasized. A brief description of the control approach used and of the safety and security*



*mechanism of the remote control setup are presented. The main purpose of the remote control application is to serve as an educational tool for distance learning.*

**Keywords:** control systems, e-learning, internet based remote control.

## **A BASH SCRIPT FOR CONVERTING SPICE LIKE, SCHEMA DESCRIPTION - TEXT FILES, INTO MODIFIED NODAL EQUATION MATRIX WITH SYMBOLIC ELEMENTS**

C. ZORIO, M. BODEA, I. RUSU

*This paper presents an implementation of the modified nodal algorithm which can generate the description of the modified nodal matrix with symbolic formulae as elements. The output data can be stored in a text file which can be imported in a mathematical CAD environment for further mathematical symbolic complex calculations for small signal analysis of a circuit, including parameter extraction. The advantage of a symbolic method for small signal parameter extraction is that it uses a direct algorithm and initial “start values” for the parameters to be extracted are not needed anymore. In order to generate symbolic formulae as the nodal matrix elements, the syntax of the SPICE input format has to be modified. An extended syntax was proposed resulting in a modified SPICE-like text file format. The program can generate the nodal matrix of any circuit, no matter its complexity, its functionality being illustrated using as example the “Giacoletto” circuit. “Bash” sources, directly usable in any “UNIX” environment, are provided.*

**Keywords** – symbolic analysis, modified nodal analysis, small signal analysis, parameter extraction, SPICE input format.

## **INTERFACING METHODS OF THE THERMOCOUPLES IN APPLICATIONS WITH THE MICROCONTROLLER**

O. STAN, D. MIHOC

*This article deals with the interfacing modalities of the temperature sensor at the IN/OUT ports of a flash microcontroller from the PIC Microchip*

*family but also, there are being presented and analysed some of the compensation hardware methods of the cold terminal junction, the measurement corrections, the dependence of the route (amplifier to the minimal perceptible level) of the useful compensated signal with a view to its application to the input Analog-Digital converter enclosed in microcontroller.*

*By all means, the purpose of the application, the range of the measured temperature (the temperature variation) determine the choice of the most appropriated compensation methods as well as the optimal type of thermocouple or another sensor type which must be used in order to obtain a good precision of the measuring results.*

*In the author's opinion represent an original contribution, the determination and analysis the main types of the mathematical equations at the level of the AD converter enclosed in the microcontroller in order, to release the optimal resolution conversion and the interfacing methods.*

**Keywords:** Electromotive force (EMF), Seebeck coefficient, Resistive Temperature Detector (RTD)

## A SENSOR FUSION USER INTERFACE FOR MOBILE ROBOTS TELEOPERATION

Ctin NEGRESCU

*Sensor fusion is traditionally used to reduce uncertainty in obstacle detection, word modeling and localisation. This concept and technologie can also be used to improve remote control. In fact we can use sensor fusion to create user interfaces which efficiently convey information, facilitate understanding of remote environment and improve situational awareness. This is possible by selecting complementary sensors, combining information appropriately, and designing effective representations. In this paper is presented sensor fusion for mobile robots teleoperation.*

**Keyword :** human robot interaction, mobile robots, sensor fusion display