2011	Faculty of Engineering at Helwan

Journal I.F =0.371	EUROPEAN TRANSACTIONS ON ELECTRICAL Eurp. Trans. Electr. Power (2011) Publish online in wiley online library (wileyonlinelibrary.com).Dol:10.1002/step.647

Research Title	LABORATORY INVESTIGATION FOR POWER TRANSFORMER PROTECTION TECHNIQUE BASED ON POSITIVE SEQUENCE ADMITTANCE APPROACH
Authors	Moustafa Mohammed Eissa, El Hassan Shehab-Eldin, Mohmoud Elshahat Masoud and Ahmed Sayed Abd-Elatif
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Abstract

This paper presents a new digital technique for transformer protection. The technique uses the accumulated positive sequence admittance at the two sides of the power transformer. The instantaneous measurements of phase voltage and line current signals at the transformer terminals are used to calculate the accumulated positive sequence admittances. A 500/230-kV YIY transformer connected to a 230-kV power system is simulated using MATLAB/SIMIULlNK tool. The method depends on standalone decision at the two terminals of power transformer. A real-time investigation for power transformer in normal and abnormal conditions based on experimental setup is given. The experimental setup uses a transformer of (5 kVA, 220/110 V) for testing purposes. The simulated and experimental results indicated that the proposed technique is stable, reliable, and fast during the discrimination between internal and external faults, magnetizing inrush currents, and switching on internal faults.

Key words	Power transformer; instantaneous voltage and current measurements; positive sequence admittances; accumulated admittances; Lab-View; data acquisition; and experimental setup

Journal I.F =1.694	Materials and Design 32 (2011) 146-153

Research Title	PROCESSING OF POROUS TI AND TI5MN FOAMS BY SPARK PLASMA SINTERING
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Abstract

Titanium and its alloys are one of the best metallic biomaterials to be used for implant application. In this study, porous Ti and Ti5Mn alloy with different porosities were successfully synthesized by powder metallurgy process with the addition of NH4HC03 as space holder and TiHz as foaming agent. The consolidation of powder was achieved by spark plasma sintering process (SPS) at 16 MPa and pressureless conditions. The morphology of porous structure was investigated by using scanning electron microscopy (SEM) and X-ray micro-tomography (J.!-CT). Nano-indentation tester was used to evaluate Young's modulus of the porous Ti and Ti5Mn alloy. Experimental results showed that pure Ti sample, which sintered under pressure of 16 MPa, full relative density was achieved even at a relative low sintering temperature 750°C; however, in the case of pressureless condition at sintering temperature 1000 DC the porosity was 53% and Young's modulus was 40 GPa. The Ti5Mn alloy indicated a good pore distribution, and the porosity decreased from 56% to 21 % by increasing the sintering temperature from 950°C to 1100 0C. Young's modulus was increased from 35 GPa to 51.83 GPa with increasing of the sintering temperatures from 950°C to 1100 dc.

Key words	Porous material Spark plasma sintering Biomedical applications

Journal I.F =4.232	IEEE journal on selected areas in communications, vol. 28, NO.7, Septemerer 2010

Research Title	**HARNESSING BATTERY RECOVERY EFFECT IN WIRELESS SENSOR NETWORKS: EXPERIMENTS AND ANALYSIS**
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Abstract

Abstract-Many applications of wireless sensor networks rely on batteries. But most batteries are not simple energy reservoirs, and can exhibit battery recovery effect. That is, the deliverable energy in a battery can be self-replenished, if left idling for sufficient time. As a viable approach for energy optimisation, we made several contributions towards harnessing battery recovery effect in sensor networks. 1) We empirically examine the gain of battery runtime of sensor devices due to battery recovery effect, and affirm its significant benefit in sensor networks. \Ve also observe a saturation threshold, beyond which more idle time will contribute only little to battery recovery. 2) Based on our experiments, we propose a Markov chain model to capture battery recovery considering saturation threshold and random sensing activities, by which we can study the effectiveness of duty cycling and buffering, 3) We devise a simple distributed duty cycle scheme to take advantage of battery recovery using pseudo-random sequences, and analyse its trade-oil" between the induced latency of data delivery and duty cycle rates,

Key words	Wireless Sensor Networks, Energy Optimization, Battery Recovery Effect, Duty Cycle

2011	Faculty of Engineering at Helwan

Journal I.F =0.683	Mobile Netw Appl (2011) 16:4-16

Research Title	BTAC: A BUSY TONE BASED COOPERATIVE MAC PROTOCOL FOR WIRELESS LOCAL AREA NETWORKS
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Affiliation	[b] Department of Electronic and Electrical Engineering, University College London, London WClE 7JE, UK, e-mail: yangyang@ieee.org [a] Department of Communications and Electronics Engineering, Helwan University, Helwan, Egypt, e-mail: s.sayed01@yahoo.com [c] Shanghai Research Center for Wireless Communications (WiCO), 280-1 Linhong Road, Changning, Shanghai 200335, China

Abstract

Cooperative communications has been actively studied as an effective approach to achieve multi-user/spatial diversity gains and better overall system performance by coordinating multiple users in a dynamic wireless network to share their resources and capabilities. Based on the concept of cooperative communications, this paper proposes and analyzes a Busy Tone based cooperative Medium Access Control (MAC) protocol, namely BTAC, for multi-rate Wireless Local Area Networks (WLANs). A cross-layer Markov chain model is then developed to evaluate the performance of BT AC under dynamic wireless channel conditions. Analytical and simulation results show our BT AC protocol is simple, robust, fully compatible with the IEEE 802.11b standard and can achieve better throughput and delay performance than the standard Distributed Coordination Function (DCF) protocol and the recently-proposed Coop MAC protocol.

Key words	cooperative communications ·wireless local area network- IEEE 802.11 .medium ccess control

Journal I.F =3.745	Progress In Electromagnetic Research B, Vol. 37, 21-42, 2012

Research Title	AN INTERACTION STUDY BETWEEN PIFAS HANDSET ANTENNA AND A HUMAN HAND-HEAD IN PERSONALCOMMUNICATIONS
Authors	[a] A. M. Montaser, [b] K. R. Mahmoud, and [c] H. A. Elmikati
Affiliation	[a] Sohag University, Sohag, Egypt [b] Department of Electronics and Communications Engineering, Faculty 0f Engineering helwan university , Cairo, Egypt [c] Mansoura University, Mansoura 35516, Egypt

Abstract

In this paper, the interaction of a planar inverted-F antennas array, mounted on a mobile handset, with a human hand-head phantom is investigated in the 1.9GHz band. The hybrid approach involving the particle swarm optimization (PSO) and Nelder-Mead (NM) algorithm is considered to optimize the complex excitations of the adaptive array elements in a mutual coupling environment for different beam forming synthesis. Firstly, the effect of the human hand on the handset radiation characteristics is studied. Then, the spatial-peak specific absorption rate (SAR) values of 2- and 4-element PIFA arrays for mobile handset in the vicinity of a human hand-head are evaluated numerically for different scenarios. The antenna is analyzed completely using finite difference time domain (FDTD) method while the interaction is performed using the CST Microwave Studio software.

Key words	F antennas array, mobile handset, PIFA arrays, CST Microwave Studio software

Journal I.F =3.745	Progress In Electromagnetics Research, PIER 100, 105-117, 2010

Research Title	DESIGN OPTIMIZATION OF A BOW-TIE ANTENNA FOR 2.45 GHz RFID READERS USING A HYBRID BSONM ALGORITHM
Authors	K. R. Mahmoud
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Abstract

Recently the Bacterial foraging optimization algorithm (BFA) has attracted a lot of attention as a high-performance optimizer. This paper presents a hybrid approach involving Bacterial Swarm Optimization (BSO) and Nelder-Mead (NM) algorithm. The proposed algorithm is used to design a bow-tie antenna for 2.45GHz Radio Frequency Identification (RFID) readers. The antenna is analyzed completely using Method of Moments (MoM), then the MoM code is coupled with the BSO-NM algorithm to optimize the antenna. The simulated antenna and the optimization algorithm programs were implemented using MATLAB version 7.4. To verify the validity of numerical simulations, the results are compared with those obtained using Feko Software Suite 5.3.

Key words	Bacterial foraging optimization algorithm, BSO, Numerical simulation

Journal I.F =0.844	Electromagnetics, 31:578-592, 2011

Research Title	CENTRAL FORCE OPTIMIZATION: NELDER-MEAD HYBRID ALGORITHM FOR RECTANGULAR MICROSTRIP ANTENNA DESIGN
Authors	K. R. MAHMOUD
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Abstract

In this article, an efficient global hybrid optimization method is proposed combining central force optimization as a global optimizer and the Nelder-Mead algorithm as a local optimizer: After the final global iteration, a local optimization can be followed to further improve the solution obtained from central force optimization. The convergence capability of the hybrid central force optimization-Nelder-Mead approach is compared with other recent evolutionary-based algorithms using 13 benchmark functions grouped into unimodal and multimodal functions. In addition, the proposed algorithm is used to calculate accurately the resonant frequency and feed-point position of rectangular microstrip patch antenna elements with various dimensions and various substrate thicknesses. It is found that, in addition to decreasing the required evaluation number and the required processing time, excellent results are obtained.

Key words	Central force optimization, Nelder-Mead algorithm. rectangular microstrip antenna, resonant frequency, feed position

Journal I.F =1.2	IEEE TRANSACTIONS ON POWER DELIVERY. VOL. 25. NO. I. JANUARY 2010

Research Title	A NOVEL BACK UP WIDE AREA PROTECTION TECHNIQUE FOR POWER TRANSMISSION GRIDS USING PHASOR MEASUREMENT UNIT
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Abstract

Current differential protection relays are widely applied to the protection of electrical plant due to their simplicity, sensitivity and stability for internal and external faults. The proposed idea has the feature of unit protection relays to protect large power transmission grids based on phasor measurement units. The principle of the protection scheme depends on comparing positive sequence voltage magnitudes at each bus during fault conditions inside a system protection center to detect the nearest bus to the fault. Then the absolute differences of positive sequence current angles are compared for all lines connecting to this bus to detect the faulted line. The new technique depends on synchronized phasor measuring technology with high speed communication system and time transfer GPS system. The simulation of the interconnecting system is applied on 500 kV Egyptian network using Matlab Simulink. The new technique can successfully distinguish between internal and external faults for interconnected lines. The new protection scheme works as unit protection system for long transmission lines. The time of fault detection is estimated by 5 msec for all fault conditions and the relay is evaluated as a back up relay based on the communication speed for data transferring.

Key words	Digital protection, discreet Fourier transform,(GPS) system, synchronized phasor measurement, time synchronization

Journal I.F =2.090	Materials Science and Engineering A 534 (2012) 514-520

Research Title	EFFECT OF COOLING RATE CONTROLLED FORGING ON PROPERTIES OF LOW CARBON MULTI-MICROALLOYED
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Abstract

Two low carbon steel grades were used in the present investigation. One of them was microalloyed with Ti, V. and Nb. Both steel grades were subjected to a controlled hot forging followed by either cooling in air or quenching water. The microstructures of all TMT conditions are dominated by ferrite phase with different morphologies and grain sizes according to both chemical composition and cooling rate. Polygonal ferrite is considered to be a dominated phase of air cooled microstructures for both steel grades that is responsible for decreasing the hardness. Yield . and tensile strength with the attendant increase in ductility. Water quenching leads to a formation of relatively fine polygonal ferrite in low carbon steel or transformation into acicular ferrite in low carbon microalloyed steel. Relatively fine polygonal ferrite and acicular ferrite increase strength but decrease ductility. The cooling rate has a negligible effect on the impact toughness at room temperature.

Key words	Low carbon (LC) steel Low carbon microalloyed (LC-MA) steel

Journal I.F =1.471	Ceramics International 36 (2010) 1327-133 www.elsevier.comllocate/ceramint

Research Title	**INVESTIGATION OF THE EFFECT OF ZrO_2/AND ZrO_2/Al_2O_3 ADDITIONS ON THE HOT-PROPERTIES OF EQUIMOLECULAR MIXTURES OF α- AND β-Si_3N_4**
Authors	E.M.M. Ewais [a] , M.A.A. Atria [b], A. Abousree-Hegazy[b], R.K. Bordia [C]
Affiliation	[a] Refarctory & Ceramic Materials Lab (RCML). Central Metallurgical R&D Institute. P.O. Box 87 Helwan, Cairo, Egypt [b]Mechanical Engineering Department, Faculty of Engineering, Helwan University, P.O. Box 11792 Helwan, Cairo, Egypt [C] Department of Materials Science and Engineering, University, of Washington, Roberts Hall, Seattle, WA 98195, USA

Abstract

In this work, hot-pressing of equimolecular mixtures of a- and Jj-Si3N4 was performed with addition of different amounts of sintering additives selected in the $Zr0_2$-$A1_20_3$ system. Phase composition and microstructure of the hot-pressed samples was investigated. Densification behavior, mechanical and thermal properties were studied and explained based on the microstructure and phase composition. The optimum mixture from the $Zr0_2$-$A1_20_3$ system for hot-pressing of silicon nitride to give high density materials was determined. Near fully dense silicon nitride materials were obtained only with the additions of zirconia and alumina. The liquid phase formed in the zirconia and alumina mixtures is important for effective hot-pressing. Based on these results, we conclude that pure zirconia is not an effective sintering additive. Selected mechanical and thermal properties of these materials are also presented. Hot-pressed Si3N4 ceramics, using mixtures from of $Zr0_2/Al_20_3$ as additives, gave fracture toughness, K_1c in the range of 3.7-6.2 MPa m $_1/$ $_2$ and Vicker hardness values in the range of 6-12 GPa. These properties compare well with currently available high performance silicon nitride ceramics. We also report on interesting thermal expansion behavior of these materials including negative thermal expansion coefficients for a few compositions.

Key words	A. Hot-pressing; D. Si3N4; D. Zr02; D. A1203; C. Mechanical properties; C. Thermal properties; Microstructure