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BOOK OF ABSTRACTS

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April 17-21 2019 Belgrade Serbia

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III INTERNATIONAL CONFERENCE ON ENGINEERING TECHNOLOGY AND INNOVATION

ISBN 978-605-67955-8-9

III BOOK OF ABSTRACTS OF THE INTERNATIONAL CONFERENCE ON ENGINEERING TECHNOLOGY AND INNOVATION APRIL 17-21, 2019 BELGRADE

Edited by
Prof. Dr. Özer Çınar

Published, 2019

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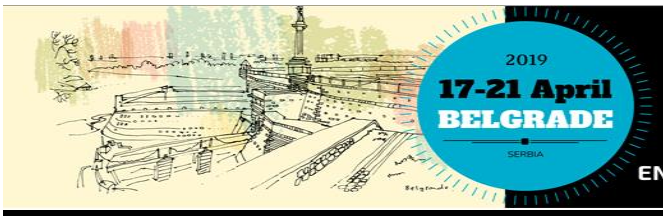
Best regards,

Prof. Dr.Özer ÇINAR



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IMPROVING THE MEASUREMENT PROCEDURE OF QUBIT-BASED SENSOR VIA FEEDBACK CONTROL ALGORITHMS

Sergey Borisenok[a]*

[a]Abdullah Gul University

*borisenok@gmail.com

Abstract:

The extreme sensitivity of quantum systems towards the external perturbations and their ability to be strongly coupled to the measured target field makes them to be stable under the environmental noise. A high quality quantum sensor can be engineered even on the platform of a single trapped qubit.

Different measurement procedures, like Jachymski - Wasak - Idziaszek (JWI) measurement protocol proposed in 2018, have been developed experimentally for qubit-based quantum sensors. In JWI sensing the particles pass through 1D waveguides containing confined ultracold atoms (trapped measuring qubits). The probability for transmission or reflection of the colliding particles depends strongly on the total external field strength.

For the JWI sensoring procedure we developed a control algorithm for measuring qubits. The external field defining the effectiveness of the JWI measurement acts for the given qubit as a set of quantum operators changing their properties in time. For that reason we involve here completely novel object, the universal dynamical quantum gate, Switching from one logical operation to another dynamically but not in the sequence of different static logical gates can optimize the efficiency of quantum algorithm and minimize the negative effect of decoherence.

We applied this concept to improve the sensor performance based on the set of parameters, including the operational fidelity and the quantum Fisher parameter that defines a lower bound of uncertainty of the inferred value for the measured external field.

We check different alternative optimal and sub-optimal feedback control algorithms to compare their pros and cons. Here we present our results for a single qubit without the distinct decay due to its weak coupling to the environment and discuss the perspectives for the development of our approach.

Keywords: Quantum Sensors, Control Algorithms, Feedback Tracking*

EFFECTIVENESS OF A CYCLOIDAL PULSE MODEL FOR EVALUATING ISOLATION SYSTEMS OF BUILDINGS WITH LRBS CONSIDERING HEATING EFFECTS

Zafer Kanbir[a], Seda Oncu-Davas[a], Hatice Gazi[a], Cenk Alhan[a]*

[a]Istanbul University - Cerrahpasa

*cenkalhan@istanbul.edu.tr

Abstract:

Seismic isolation systems which are used to mitigate the harmful effects of earthquakes on structures can protect structural and non-structural elements and even vibration-sensitive contents. However, they are challenged by the pulse-like near-fault earthquakes containing long-period large-velocity pulses which may cause excessive isolator displacements. Furthermore, the lead core heating in lead rubber bearings (LRBs) leads to decrease in the characteristic strength and consequently notable increase in base displacement especially under pulse-like near-fault earthquakes. This phenomenon raised the interest of researchers on the performance of seismically isolated buildings with LRBs under such earthquakes. Because of the scarcity of historical pulse-like near-fault earthquake records, synthetic pulse models that can approximately represent these records have been developed by various researchers for conducting comprehensive parametric studies. Among these, the half-cycle forward cycloidal pulse model, Type-A [N. Makris, "Rigidity-plasticity-viscosity: can electrorheological dampers protect base-isolated structures from near-source ground motions?", Earthquake Engineering and Structural Dynamics, vol. 26, pp. 571-592, 1997] is used in various research studies because of its analytical simplicity. In this study, the capability of this model in representing actual pulse-like near-fault earthquake records in terms of the isolation system response is investigated in the context of a benchmark 4-story seismically isolated building subjected to a historical pulse-like near-fault earthquake record and its synthetically generated counterpart Type-A cycloidal pulse model, when lead core heating is considered. Base displacement time histories and force-displacement hysteretic curves of LRBs demonstrate the success of Type-A cycloidal pulse model.

Keywords: Seismic Isolation; Near-Fault Earthquake; Ground Motion Pulse Model; Lead Rubber Bearing, Lead Core Heating.

*This work was supported by the Scientific Research Projects Coordination Unit of Istanbul University-Cerrahpasa. BYP-2018-28620.

EFFECT OF ACCIDENTAL ECCENTRICITY ON THE ISOLATION SYSTEM RESPONSES OF CYLINDRICAL LIQUID STORAGE TANKS

Elif Guler[a], Cenk Alhan[b]*

[a]Istanbul University - Cerrahpasa

*cenkalhan@istanbul.edu.tr

Abstract:

Liquid storage tanks may be used for storing water, chemicals, petroleum products, toxic or flammable liquids, etc. which makes them strategically and even vitally important structural systems. In recent years, the protection of liquid storage tanks from detrimental effects of earthquakes by introducing isolation systems at the base of these structures has been proposed and different aspects of these systems are evaluated by various researchers. One aspect that is less treated by others is the accidental eccentricity that may come into scene in the isolation system due to various reasons such as errors in the production of isolators, non-uniform variation of the mechanical properties of isolators in time throughout the isolation system plan, etc. And accidental eccentricity may cause significant amplifications particularly in the isolation system responses compared to the completely symmetric case, which could have considerable impact in the design of base-isolated liquid storage tanks. In order to examine this issue, base displacement and isolator shear forces of a benchmark cylindrical liquid storage tank are comparatively examined for different isolation system accidental eccentricities (e = %0, %5, %10 and %15) under a representative near-field and a representative far-field earthquake record. The nonlinear time history analyses are performed with 3D-BASIS-ME academic software which allows for modeling of base-isolated liquid storage tanks through a special modeling approach that combines single-degree-of-freedom systems representing fluid-tank interaction, fluid sloshing, and rigid-convective modes on a common base-mat. Results show that the isolation system responses increase as accidental eccentricity increases.

Keywords: Cylindrical Liquid Storage Tank; Seismic Isolation; Isolation System Eccentricity; Isolation System Response.

**This work was supported by the Scientific Research Projects Coordination Unit of Istanbul University-Cerrahpasa. BYP-2018-28620.*

THE BENEFITS AND CHALLENGES OF ON-SITE 3D-PRINTED CONSTRUCTION: A CASE STUDY

Jenee A. Jagoda[a]*, Michael P. Case[a], Brandy N. Diggs-Mcgee[a], Eric L. Kreiger[a], Megan A. Kreiger[a], Steven J. Schuldt[a]

[a]Air Force Institute Of Technology

*jenee.jagoda@afit.edu

Abstract:

In December 2018, U.S. Marines, Navy Seabees, an Air Force officer, and researchers from the Army Engineer Research and Development Center - Construction Engineering Research Laboratory (ERDC-CERL) demonstrated the capability of three-dimensional (3D) printed construction in an expeditionary environment at Marine Corps Base Camp Pendleton, California. The tri-service exercise culminated in the on-site construction of a 33-foot concrete bridge – the first of its kind to be both printed and placed in a field environment – using a 3D printer developed by ERDC-CERL and Caterpillar, Inc. under a cooperative research and development agreement. In this exercise, the 3D printer was disassembled, packed in a shipping container, and transported via semi-truck from Champaign, Illinois to Camp Pendleton, where a team of seven Marines assembled it on a level, open area close to the dry culvert where the bridge would be placed. The Marines performed initial beam and pier design; ERDC-CERL completed the structural design, steel reinforcement, and conversion to Linux CNC G-code. The concrete ingredients were measured and mixed by the Seabees using a volumetric mixer ("CreteMobile") and a skid steer with concrete mixer attachment. After mixing, the concrete was deposited into a pump and transported through an insulated hose to the printer nozzle. Each beam was printed sequentially; the piers were printed concurrently to provide additional curing time. Reinforcement and forklift pockets were laid manually during pauses between print layers. As printing progressed, the finished members were covered and allowed to cure for two to five days before placement. Despite challenges with weather, materials, and power, the U.S. military successfully demonstrated the potential of 3D-printed construction in the expeditionary environment by proving it is possible to print and place a bridge on-site using locally sourced materials. Specifically, the exercise revealed opportunities to further automate the 3D printing process and lessen the manpower demand.

Keywords: 3D Printing, Concrete, Construction, Military

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SOLUTION OF TASK SCHEDULING PROBLEM FOR AUTONOMOUS TRANSFER VEHICLES ON GPU-CPU AND PERFORMANCE EVALUATION

Tahir Ozdemir[a]*, Azmi Cibi[a], Ahmet Yazici[b]

[a]Department Of Computer Engineering, Eskisehir Osmangazi University

*tahirozdemir34@gmail.com

Abstract:

Autonomous transfer vehicles (ATVs) are critical components of Industry 4.0. They helps realizing flexible manufacturing systems in an efficient way. It is very important to have a fast problem solution for task scheduling of ATVs. However, task scheduling is a NP-hard problem, and finding a proper solution takes a long time using classical methods. In order to find a solution in a reasonable time, meta-heuristic algorithms are widely used. They provide an acceptable balance between solution quality and time spent. Additionally, GPUs are highly effective for making computations on vectors and matrices. Since meta-heuristic algorithms generally use vectors for their solution data structure, GPUs help decreasing the solution time of these algorithms.

In this study, it was aimed using the parallel computational power of GPUs for solving task scheduling problem of ATVs. Simulated Annealing (SA) Algorithm was implemented on CUDA toolkit. It provides libraries and software tools for this purpose. Also, it is the most widely used tool for GPU programming. The challenge includes making problem suitable for parallel computation. Firstly, the sub-steps of the SA Algorithms that includes vector or matrix operations was determined. Then, these parts were implemented on GPU while the remaining was implemented on CPU. The overall solution was also compared to CPU-only solution to find the savings.

Keywords: Simulated Annealing, GPU, CUDA, ATV, Task Scheduling

**This work is supported by the Scientific and Technical Research Council of Turkey (TUBITAK), Contract No 116E731*

EARING PREDICTION OF A CUP DRAWING PROCESS BASED ON THE QUADRATIC HILL YIELD FUNCTION

Toros Arda Aksen[a]*, Bora Sener[b], Emre Esener[c], Mehmet Firat[a]

[a]Sakarya University
[b]Yildiz Technical University
[c]Bilecik Seyh Edebali University

*ardaaksen@sakarya.edu.tr

Abstract:

Quadratic Hill yield function is based on the changing of the material's basic parameters depending on the directions. During the rolling operations, Texture effect and plastic anisotropy are appeared on material. Hence, in sheet metal forming processes such as deep drawing, implementing of finite element method according to anisotropic material properties is crucial for accurate solutions.

In this work, after a deep drawing process, thickness strain distributions and the cup height profile of sheet metal will be probed using finite element method. Material of the sheet metal will be determined as Al2090-T3. MSC.Marc commercial software will be used for FEM analyses and shell element type will be used for modeling the circular sheet metal blank. In addition, effect of the element density will be regarded for simulations. Because of the anisotropy, thickness strain distributions after forming will be obtained depending on the rolling direction and transversal direction separately. Cup height profile will be also generated after forming process. Results will be compared with the experimental outcomes.

Keywords: Cup Drawing, Cup Height Profile, Thickness Strain Distribution, Quadratic Hill Yield Function

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REMOVAL OF CONGO RED FROM AQUEOUS SOLUTIONS BY ADSORPTION ON PEANUT HULL

Serap Findik[a]*

[a]Hitit University

*serapfindik@hitit.edu.tr

Abstract:

Congo red is an anionic diazo dye. It is widely used in different industries such as textile, leather, paper, rubber, plastics and cosmetics. If congo red aqueous solution is discharged into water sources, serious environmental problems are observed due to toxic, carcinogenic and mutagenic characteristics. Azo dyes contains symmetric aromatic structure and there is a resistance to biodegradation. Different treatment methods have been used used for the removal of dyes from the wastewater such as coagulation, ozonation, oxidation, adsorption and sonolysis. Adsorption is a simple and inexpensive treatment method. Adsorbents from agricultural waste is preferred due to low cost and easily available.

In this study, removal of congo red from aqueous solution was investigated by adsorption. Peanut hull was used as an adsorbent. The effects of parameters such as contact time, initial dye concentration, adsorbent amount, particle size and temperature were studied on the removal of congo red. It was observed that the removal of congo red increased with increasing adsorbent amount and with decreasing particle size. The removal of congo red decreases with increasing temperature as well. Adsorption rate increases up to 60mg/L initial concentration and then decreases. The adsorption equilibrium was reached about one hour. Adsorption kinetics of congo red removal on the peanut hull followed by pseudo second order kinetic model in studied experimental conditions.

Keywords: Adsorption, Congo Red, Kinetics, Peanut Hull

*

OPTIMIZATION OF PARAMETERS OF TUNED MASS DAMPERS BY USING HYBRID METAHEURISTIC ALGORITHMS

Eylem Ayyildiz[a], Sinan Melih Nigdeli[a]*, Gebrail Bekdas[a]

[a]Istanbul University - Cerrahpasa

melihnig@istanbul.edu.tr

Abstract:

In vibration control of mechanical systems, tuned mass dampers (TMDs) are used as a passive control device. TMDs have been also added to civil structures excited by wind, earthquake and traffic loads. The key factor of a TMD is the perfect tuning of the parameters such as stiffness and damping coefficients. Otherwise, TMD will not be effective on the vibration control of main structure. For this purpose, several optimum tuning approaches have been developed. Most of the methods employ metaheuristic algorithms inspired by natural phenomena. In the present study, several hybrid algorithms are developed for optimum tuning of TMD positioned on a single degree of freedom structure under earthquake excitation in order to find a precise solution. The hybridization is done by using metaheuristic algorithms called Flower Pollination Algorithm (FPA), Teaching Learning Based Optimization (TLBO) and Jaya Algorithm (JA). These algorithms have different features. FPA is a two-phase algorithm with a switch probability to choose a phase in an iteration. TLBO is also a two-phase algorithm, but the two phases are consequently done. JA is a single-phase algorithm. The hybrid methods are effective in finding the optimum parameters of TMDs.

Keywords: Tuned Mass Damper, Metaheuristic Algorithms, Optimization

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THE PURE BENDING FATIGUE BEHAVIOUR OF THE HEAVILY DRAWN STEEL FILAMENTS

Hayrettin Ahlatci[a]*, Yunus Turen[a], Yavuz Sun[a], Huseyin Koymatcik[b]

[a]Department Of Metallurgical And Material Science Engineering, Engineering Faculty, Karabuk University
[b]Karabuk Iron And Steel C.O.

*hahlatci@karabuk.edu.tr

Abstract:

Steel cord filaments used to are building blocks of a tire, with a high fatigue strength meets the needs such as long life, better fuel economy, and in particular safety. Accurate estimation of fatigue behaviors of cord steel during its service is of vital importance because of this variable repeated loading. The effect of the manufacturing and carbon content on the fatigue strength was examined. Fatigue tests of the steel filaments in diameter of 0.25 mm with two different Carbons (0.70%C and 0.90%C). carried out a frequency of 10 Hz via a custom manufactured pure bending testing machine of which the fully reserved strain amplitudes (R = εmin/εmax= −1.) The applied value of strain amplitudes has been chosen from the range 0.30%-1.07% as alternating of tension and compassion with each rotation bending strain. The fatigue strain limit values have been determined on the plot of S-N strain-cycle curves as 0.55% and 0.30% units for the steels of the NT250-70 C and UT250-90 C quality, respectively

Keywords: Steel Tire Cord, Carbon Content, Pure Bending Fatigue

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THE FATIGUE CRACK PROPAGATION OF THE HEAVILY DRAW ROD FILAMENTS

Hayrettin Ahlatci[a]*, Yavuz Sun[a], Yunus Turen[a], Huseyin Koymatcik[b]

[a]Department Of Metallurgical And Material Science Engineering, Engineering Faculty, Karabuk University,
[b]Karabuk Iron And Steel C.O.

*hahlatci@karabuk.edu.tr

Abstract:

The crack initiation and propagation by fatigue loading are influenced by microstructural parameters of the investigated materials such as ferritic-pearlite steel and/or eutectoid steels. The fatigue cracking morphology of The ferritic-pearlitic steels with networked and/or islands of pearlite colonies (isolated distribution) is lover tortuous than in those with uniformly distributed pearlite structure The crack path progressed by fatigue test is affected by microstructure features of the investigated filaments. The Scanning Electron Microscopic inspection has demonstrated that tortuous stable fatigue cracks areas and angled rapid fatigue fracture zones carried out in sequential order. The tortuous crack path induced crack interlocking as well as crack closure. The crack interlocking areas of the NT250-70C filaments are higher than that of the UT250-90C quality filaments. The crack path progressed by fatigue test is effected by microstructures features of the investigated filaments. Inclined rapid fatigue cracks advance along the cementite fiber seam in the structure.

Keywords: Fracture Surfaces, Crack Mechanism, Creck Growth

*

ELECTROCHEMICAL BIOSENSOR PERFORMANCE OF ACID AND HEAT TREATED PAN NANOFIBER COATED GRAPHITE ELECTRODE

Yakup Aykut[a]*, Seval Aydin[a], Nilay Aladag Tanik[a]

[a]Bursa Uludag University

*yakupaykut@gmail.com

Abstract:

In this study, electrochemical performance of neat, aqueous sulfuric acid and thermally treated cylindrical graphite and its polyacrylonitrile (PAN) nanofibers coated counterparts were investigated by focusing on guanine oxidation signal. For this purpose, an appropriate ratio of PAN was dissolved in N,N-dimethylformamide (DMF) by magnetically stirring. Then, the homogeneous polymer solution was properly electrospun on the rotating cylindrical graphite electrode. Before DNA immobilization on the nanofiber coater graphite electrodes, the coated electrodes were first acid treated with aqueous sulfuric acid and then thermally treated. Finally, guanine oxidation signals of the immobilized DNA on the nanofiber coated electrodes were electrochemically investigated. It was concluded that guanine oxidation sensation was decreased and finally diminished with sulfuric acid treatment and a following heat treated samples because sulfuric acid did not evaporate significantly at the examined temperatures and the residual sulfuric acid on the electrode surfaces did not allow the attachment of the DNA molecules properly on the surface and hence guanine oxidation signal was not perceived appropriately by the electrodes.

Keywords: Polyacrylonitrile, Nanofibers, Electrospinning, Sulfuric Acid, DNA Biosensor, Guanine

*

THE METRICS TO MEASURE AND EVALUATE SOFTWARE DEVELOPERS' PERFORMANCE

Kokten Ulas Birant[a]*, Mustafa Batar[b]

[a]Dokuz Eylul University Dept Of Computer Engineering
[b]Dokuz Eylul University The Graduate School Of Natural And Applied Sciences

*ulas@cs.deu.edu.tr

Abstract:

Up to now, several metrics have been determined and arisen in order to measure and evaluate software developers' performance: Productivity, Engagement, Attention to Quality, Code Based Knowledge, Skills and Management, Adherence to Coding General Structure and Techniques, Learning and Skills, Personal Responsibility, etc. However, there is not any universally accepted a set of metrics or methodology to measure and evaluate software developers' performance. Three main reasons of this situation which may be thought; Firstly, each part of software creation is unique. There is no compelling reason to assemble two times the same parts of software as it might be duplicated by copying it. This makes it truly difficult to make a formal and thorough correlation between two parts of software based on both qualitative and quantitative approach. Secondly, the current technology is something that changes at a truly fast pace (phase). So, as a natural result of this situation, each time a methodology in respect to a certain wave of technology or technology-based metrics is dependable enough, it is for the most part as of recently old and obsolescence in time. Thirdly, there is a gigantic zone for innovativeness in discovering the diverse answers for a unique issue. For instance, calculating coding lines that software developers write for the same problem means size of the solution, not the problem. This case shows us difficulty of turning or converting tangible data to the metric in software developers' performance. In this study, the researches, which have been done before about performance criteria, and the case studies, which have been published before about performance criteria, have been observed, analyzed and evaluated (in total 18 separate research and study). In the light of these consequences, a measurement and evaluation criteria set about the software developers' performance have been created and centered into "Software Engineering".

Keywords: Software Engineering, Software Developers, Performance Criteria

*

OPTIMUM DESIGN OF T-BEAMS USING JAYA ALGORITHM

Aylin Ece Kayabekir[a], Gebrail Bekdas[a], Sinan Melih Nigdeli[a]*

[a]Istanbul University - Cerrahpasa

*melihnig@istanbul.edu.tr

Abstract:

The main goal of an engineer is to find the best suitable design with the minimum cost. For that reason, the optimization of an engineering design is important. Engineering optimization problems are non-linear because of high number of design constraints. Especially, optimum cost design of reinforced concrete (RC) members has several types of constraints. For example, the optimum design problem of RC beams has behavior, strength and constructive constraints. To consider these constraints, a metaheuristic algorithm called Jaya Algorithm (JA) is employed in the development of the cost optimization method. JA is a single-phase algorithm considering best and worst existing solutions in an iteration. Because of this, it has a good convergence rate while the worst solution is diverged. Also, JA has no specific parameters. In the present study, the numerical example is compared with the classical solutions and the proposed method is effective to find the optimum design for singly reinforced RC beam.

Keywords: Reinforced Concrete, Metaheuristic Algorithms, Optimization

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DEVELOPMENT OF LOW COST MASS MEASUREMENT SYSTEM USING QUARTZ CRYSTAL MICROBALANCE TECHNIQUE

Mustafa Karapinar[a], Serkan Gurkan[a], Alper Poyraz Oner[b], Seydi Dogan[b]*

[a]Department Of Electrical And Electronics, The Nco Academy, National Defence University, Balikesir-Turkey

[b]Department Of Electrical And Electronics Engineering, Engineering Faculty, Balikesir University, Balikesir-Turkey

*dogans@balikesir.edu.tr

Abstract:

The aim of this work is the multichannel and low cost measurement of quite small masses using quartz crystal microbalance (QCM) technique performed with a microcontroller-based system. The conventional mass measurement methods are based on using of gravitational force acting on the substances. Recently, a different method has been used to measure small masses. If the mass to be measured is placed on a system having regular mechanical vibrations, the natural frequency of the system changes. Therefore, by using the frequency changes, very small masses, which are difficult to measure by classical methods, can be easily measured. QCM is a low cost and very precise mass measurement method based on piezoelectric effect. We have designed a system which has multi measurement inputs using Arduino embedded platform and some PIC microcontrollers to measure small masses. The system can be operated independently or connected to a personal computer and transmit real-time measurements from multiple inputs. In situ mass measurement which is related to frequency change can be observed on computer screen by means of a developed software interface.

Keywords: Quartz Crystal Microbalance, Mass Measurement, Microcontroller, Piezolectric Effect.

Prof. Dr. S. Dogan would like to thank to Turkish Academy of Sciences (TUBA) for partial support

EMIC: AN ENSEMBLE APPROACH FOR IMPROVING MULTI-INSTANCE CLASSIFICATION

Kokten Ulas Birant[a]*, Pelin Yildirim Taser[b], Derya Birant[a]

[a]Dokuz Eylul University Department Of Computer Engineering
[b]Manisa Celal Bayar University Department Of Software Engineering

*ulas@cs.deu.edu.tr

Abstract:

Multi-instance classification is a supervised learning technique which aims to predict the labels of the bags that consists of unlabeled instances with multi-feature vectors. In the last decide, ensemble learning has become one of the most popular machine learning method since it generally provides more accurate classification results than the individual classifiers. Considering this motivation, the study presented in this paper combines these two techniques to benefit from their capabilities together. This paper proposes an ensemble-based multi-instance classification (EMIC) approach which combines a set of individual multi-instance classifiers to obtain final class label using a voting mechanism. This study also compares the suggested EMIC approach with the traditional multi-instance classification methods in terms of classification accuracy. In the experimental studies, the EMIC approach was tested on various real-world and well-known multi-instance datasets. The results indicate that the proposed ensemble approach generally archives higher classification performance than the individual multi-instance classification algorithms.

Keywords: Ensemble Learning, Multi-Instance Classification, Machine Learning

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ANTIFOULING PEBA MEMBRANES FOR BIOBUTANOL RECOVERY BY PERVAPORATION

Ayca Hasanoglu[a]*, Aslihan Calhan[a], Sennur Deniz[a], Tulin Arasoglu[a]

[a]Yildiz Technical University

*aycameric@yahoo.com

Abstract:

Biobutanol is an attractive biofuel which has potential to become an alternative to conventional fuels in the future due to the growing demand for energy. Butanol can be produced by ABE fermentation. Pervaporation is considered one of the most promising tecniques to recover the butanol from the fermentation broth [1].

In this study polyetherblock amid (PEBA) pervaporation membranes were developed for butanol separation. Membranes were prepared with 5 % (wt) of PEBA solution in butanol by heat treatment. In order to enhance selective properties of the membrane and to give antifouling characteristics to the membrane, copper based metal organic framework particles, MOF-199, were incorporated in the membrane. Membranes were prepared at different thicknesses between 60-110 µm at 5 and 10% (wt) of MOF-199 loadings. Pervaporation tests were carried out using membranes with and without MOF-199 to investigate the effect of the MOF-199 in the membrane. Best results were achieved with 5% MOF-199 loading. Several process parameters including butanol concentration, temperature and feed velocity on pervaporation performance were investigated. The fluxes and selectivities were in the range of 348.8-1379.0 g.m-2.h-1 and 18.6-24.8, respectively. To investigate the antifouiling characteristics of the membrane, BSA adsorption on the membranes were carried out at several MOF-199 loadings. The adsorption of BSA molecules onto the membranes decreased with increasing MOF-199 content, indicating that the MOF particles give antifouling properties to the membrane. Also to determine the antibacterial activity of the membranes, well diffusion and antibacterial leaching tests were applied. An antibacterial activity was not observed as a result of the experiments. The developed membranes have good potential for the recovery of the butanol from the fermentation broth.

Keywords: PEBA Membrane, Antifouling, Pervaporation, Butanol

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SYSTEMS OF SYSTEMS: THE INNOVATION PHASE - HOW ARE THEY BORN?

Avi Ginzburg[a]*

[a]Technion - Israel Institute Of Technology (Iit)

*draviginzburg@gmail.com

Abstract:

In the last two decades there is an increased interest in System of Systems (SoS). The availability and affordability of communication and computers made many systems to connect to each other and create networks with different operators and stakeholders who collaborate to achieve common goals. There are many examples of SoS around us and they are part of our everyday life such as: Net Centric Warfare (NCW) System, air and land transportation, electric grid, logistics, hotel chains, navigation, banking etc… are all Systems of Systems. Medium and large systems integrators industries have a growing interest in SoS. As they are always trying to move upwards the value chain in order to maintain their survivability and growth. Since systems are part of SoS even small companies must understand the new environment of SoS. To maintain growth companies must seek for introducing new systems, capabilities or processes to the market. Today this innovation phase is done in the environment of SoS. Shumpeter claims that companies and even societies must innovate and introduce new systems in order to survive. This leads to the following most critical questions: How a System of Systems is born? What are the innovation processes the industry has to exercise in order to develop a new SoS, modify or introducing a new capability to an existing SoS? Are those processes similar to system's innovation? Or there are differences? – Those are important issues to be addressed by the academy and also by the industry in order to maintain their growth in a new world of complex SoS. Despite its importance and criticality there is not much in the literature about the innovation phase of SoS. Also there is a sever lack of engineering tools for SoS engineering to support innovation. In this paper we will discuss how Systems of Systems are born and in what aspect they are differ from Systems from the innovation point of view. We will introduce the "glue layer" concept as a new layer of SoS for engineering focus and innovation. Also we will recommend developing an innovative new engineering tool to support innovation within SoS environment.

Keywords: System Of Systtems, Innovation, Network, Operators, Stakeholders

**A related study spported by the Technion. If you will approve it I can present only on 18/4 or 19/4 morning*

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RESPONSE SURFACE METHOD FOR OPTIMIZATION OF SUSPENSION BALL JOINT PULL OUT FORCE BY USING ANSYS

Alimurtaza Rutci[a]*, Fatih Selman Eren[a]

[a]Teknorot Automotive Research And Development Center

*alimurtaza.rutci@teknorot.com

Abstract:

Suspension ball joints are used to connect the control arms to the knuckle since they are the only joints which let rotational freedom. With the objective to an adequate performance of the ball joint, it is very important to prevent the extraction of the ball stud from the ball joint housing. Ball joint's housing material and shape design must withstand axial loads in the ball stud from axial direction in order to avoid the ball stud pull out keeping the ball stud inside the housing. The ball stud pull out force is a critical and safety characteristic function because it is related to failure mode for front suspension system. In this study, we investigate how the shape design and materials effect the suspension ball joint pull out force via response surface method for optimization based on FEA method. The objective of response surface methods (RSM) is optimization, finding the best set of factor levels to achieve some goal. With respect to optimization results, it is possible to monitoring best shape and appropriate material for the ball joint design. The result of FE analysis and RSM optimizations make it possible to determination best design characteristic.

Keywords: Response Surface Method For Optimization, Ball Joint, Pull Out Force, Ansys

*"*This study is supported by Teknorot Automotive R&D Center*"*

CONTROL OF QOS OF INTERNET ACCESS THROUGH FIXED NETWORKS

Boris Arsov[a]*, Zoran Aleksov[a]

[a]Agency For Electronic Communication

*boris.arsov@aec.mk

Abstract:

AEC has the obligation to provide monitoring and control mechanisms for protecting users of internet access services. Almost every month we can see some new advertisment in witch some operator offers a service with higher speed and lower price. It is a fact that the speeds are increased, but, does the quality of the service really correspond to what is advertised? Also, not so infrequent and for different reasons, some customers a complaining for the speed that they get from the provider, but in reality they get quite fair quality service.

In order to solve the conflict between the providers and customers of internet access services through fixed networks, at AEC we have developed a system for more precise and reliable measurement of QoS of these services. The system provides accurate measurements, implemented in real terms, without affecting the usual way of using the service from customers, so the results should be accepted by both operators and customers.

The system is composed of several components, which include a server side and a client side. The server side includes: App server, DB server, web site where server web application is installed, monitoring server, test server in AEC, test servers at operators.

The client side includes: a web application that opens in a browser, a mobile application for Android and iOS smartphones, desktop application for precise measurement and a dedicated test probe. We also created set of criteria that the service should follow in order to be assessed as of good quality. All measurements are preserved and on the basis of these data the system provides statistical analysis of the speeds by regions, technologies, providers, etc. The system is open, easy to upgrade and expand. The most important planned upgrade is adding the ability to test the service in terms of net-neutrality.

Keywords: Monitoring, Internet Access Services, Customers, Fixed Networks, Measurement, Qos

*Agency for electronic communication

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