LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel) : **DESIGNING AND WEAR TESTING OF EXCAVATOR BUCKET TEETH FOR THE NEED OF INDONESIAN MINING**

Jumlah Penulis : 4 orang (**R. Ismail,** Z. Muhammad, J. Jamari and A. P. Bayuseno)

Status Pengusul : Penulis Pertama

Identitas Jurnal Ilmiah :

	a.	Nama Jurnal	:	ARPN Journal of Engineering and Applied Sciences
	b.	Nomor ISSN/ISBN	:	1819-6608
	c.	Vol, No., Bln Thn	:	Volume 15 (1), Januari 2020
	d.	Penerbit	:	Asian Research Publishing Network
	e.	DOI artikel (jika ada)	:	
	f.	Alamat web jurnal	:	http://www.arpnjournals.com/jeas/
		Alamat Artikel	:	https://www.researchgate.net/publication/339613277_DESIGNING_AND_WEAR_TESTING_OF_EXCAVATOR_BUCKET_TEETH_FOR_THE_NEED_OF_INDONESIAN_MINING
		Scopus Link	:	https://www.scopus.com/record/display.uri?eid=2-s2.0-85080137157&origin=resultslist&sort=plf-f&src=s&st1=DESIGNING+AND+WEAR+TESTING+OF+EXCAVATOR+BUCKET+TEETH+FOR+THE+NEED+OF+INDONESIAN+MINING&st2=&sid=b4713298bfacfbe88ceb91cc227eb052&sot=b&sdt=b&sl=101&s=TITLE-ABS-KEY%28DESIGNING+AND+WEAR+TESTING+OF+EXCAVATOR+BUCKET+TEETH+FOR+THE+NEED+OF+INDONESIAN+MINING%29&relpos=0&citeCnt=0&searchTerm=
	g.	Terindex	:	Scopus (SJR 0,238)
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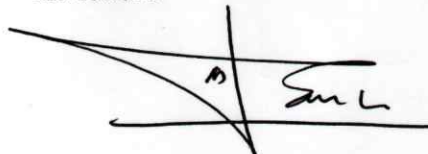| Komponen yang dinilai	Nilai Reviewer		Nilai rata-rata
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Semarang, 12 Maret 2021
Reviewer 2

Dr. Agus Suprihanto, ST., MT
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KARYA ILMIAH : JURNAL ILMIAH

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Jumlah Penulis	:	4 orang (**R. Ismail,** Z. Muhammad, J. Jamari and A. P. Bayuseno)	
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2. **Ruang lingkup dan kedalaman pembahasan:**
   Artikel ini membahas tentang pengujian keausan pada gigi *excavator bucket* buatan UNDIP. Hasil-hasil penelitian dibahas cukup lengkap dengan menganilis perbandingan hasil pengukuran berbagai produk. Hasil pengukuran ini yang berupa kekerasan dan keausan juga diberikan detil.

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Data-data hasil penelitian disajikan dengan jelas dan menarik. Hasil perbandingan empat produk *excavator bucket* ditampilkan dan didukung dengan analisis yang detil. Metodologi penelitian juga disajikan dengan lengkap. Lebih dari 50% merupakan artikel terkini (< 10 tahun saat artikel itu terbit). Turnitin similarity index juga rendah sebesar 6%.

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Semarang, 12 Maret 2021
Reviewer 1

Ir. Eflita Yohana, MT., PhD
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Komponen Yang Dinilai	Internasional Bereputasi	Internasional	Nasional Terakreditasi	Nasional Tidak Terakreditasi	Nilai Akhir Yang Diperoleh
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e. Kelengkapan unsur isi jurnal (10%)	4,00				3,00
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Total = (100%)	**40,00**				**35,00**
Nilai Pengusul (kontribusi pengusul penulis) = 40% x 35,00 = 14,00					

Catatan Penilaian artikel oleh Reviewer :
1. **Kesesuaian dan kelengkapan unsur isi jurnal:**
   Artikel yang ditulis sudah sesuai dengan format paper ARPN Journal of Engineering and Applied Sciences Abstrak, Pendahuluan, Analisis Numerik, Hasil dan Pembahasan, Kesimpulan, Referensi telah disusun secara runut. Tabel dan Gambar juga disajikan dengan jelas. Isi artikel sesuai dengan bidang pengusul yaitu Teknik Mesin.
2. **Ruang lingkup dan kedalaman pembahasan:**
   Topik artikel yang ditulis membahas tentang pengujian eksperimen performa gigi *excavator teeth* dilihat dari sisi keausan dan kekerasan. Pustaka yang digunakan sangat relevan dengan isu terkini di bidang perancangan. Pembahasan disajikan secara komprehensif dengan menganalisis banyak aspek.
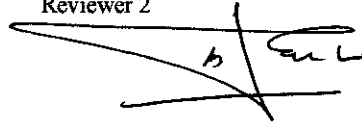3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Data yang ditampilkan cukup mutakhir. 9 dari 17 artikel merupakan paper terkini (< 10 tahun terakhir). Metodologi yang digunakan untuk menjawab permalahan utama seberapa kuat *excavator teeth* dianalisis dengan data yang lengkap. Turnitin similarity index rendah sebesar 6%.
4. **Kelengkapan unsur dan kualitas terbitan:**

Jurnal masuk ke kategori Q3 dengan SJR 0,238. Jurnal juga terindeks Scopus.

Semarang, 11 Maret 2021
Reviewer 2

Dr. Agus Suprihanto, ST., MT
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Designing and wear testing of excavator bucket teeth for the need of Indonesian mining (Article)

Ismail, R.,   Muhammad, Z.,   Jamari, J.,   Bayuseno, A.P. ✉   ⚲

Department of Mechanical Engineering, Diponegoro University, Semarang, Indonesia

Abstract   ⌄ View references (17)

The Excavator bucket tooth can be damaged due to abrasive wear and impact load after it has been operated in the field. This paper deals with a review of wear analysis of excavator bucket tooth. Excavators examined in the present study was made up of alloy steel from two branded products (ND and X). The purpose of the present work was to make a quality analysis of those bucket teeth products. Results of field test for two bucket teeth product provided the actual wear volume of 31.25 cm3 /day and 36.88 cm3 /day for ND and X tooth tested respectively. Similar to Ogoshi wear test, the X bucket teeth have a value of wear volume loss higher than that of ND bucket teeth. In this test, the specific abrasion value (K1) can be used for indicating the abrasive material hardness. The comparison of the value of specific abrasion (K1) bucket teeth on the application in the field and the Ogoshi wear test is 67 %. This suggested that the X bucket teeth can still compete with ND bucket teeth products on the marketplace. © 2006-2020 Asian Research Publishing Network (ARPN). All rights reserved.

SciVal Topic Prominence ⓘ

Topic: Excavators | Buckets | Undercarriages

Prominence percentile: 75.147   ⓘ

Author keywords

(Abrasion value) (Bucket teeth) (Field test) (Ogoshi test) (Wear)

Funding details

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ISBN: 978-303785555-3
doi: 10.4028/www.scientific.net/AMR.619.62

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Title: Synthesis of fatty ethanolamides from lauric and palmitic acid: Optimization using Response Surface Methodology

Author (s): Zuhrina Masyithah, Muhammad Ashari, Nur Annisa and Muhammad Syukri

Abstract: Response Surface Methodology is used for the prediction and optimization of the conversion of lauric and palmitic acid in the synthesis of fatty ethanolamide from monoethanolamine using zirconium (IV) chloride as a metal catalyst and n-hexane with isopropanol as a mixed solvent. By performing some experimental design by Central Composite Design, a suitable range of independent parameter of substrate molar ratio, catalyst concentration, and the solvent ratio was determined using a contour plot approach. Results show that the substrate molar ratio and catalyst concentration are the significant parameters on the lauric acid conversion, and the solvent ratio is the significant parameter on the palmitic acid conversion. The conversion is decrease by reducing catalyst concentration, and by increasing the substrate molar ratio amine to acid up to 10/1, the conversion increase but afterward gradually decreases.

Full Text

Title: Design of unpaved roads with DACE® software

Author (s): Julián Andrés Pulecio Diaz, Oscar Camilo Valderrama Riveros and Myriam Rocío Pallares Muñoz

Abstract: In this article, we introduce DACE® software as an alternative of computational calculation for the design of unpaved roads, using the semi-empirical methods of Giroud, Han and Pokharel, which were published in 2004 and 2015. As a conclusion, the use of the Hypertext Preprocessor (Php) programming language, applied in order to develop DACE®, allows it to be cross-platform software since it is a web application, therefore, it works in all operating systems. Furthermore, the results obtained using DACE®, were satisfactorily validated with the exercise proposed by Han and Pokharel in 2015, therefore, it allows to determine the thicknesses of unreinforced unpaved roads (without geosynthetic), with geotextile (woven geotextile), biaxial geogrid and geocell. Lastly, DACE® is a software that will help estimate the thickness of an unreinforced unpaved road (without geosynthetic), with geotextile (woven geotextile), biaxial geogrid and geocell, whenever the subgrades have a California Bearing Ratio of the sub-grade soil (CBRs) value equal to or less than 3% and a reliability value of 50%. In addition, itis possible to apply similar thicknesses in-situ of the specimens of the CBR and modified proctor tests.

Full Text

Title: Comparison of rainfall analysis of JAXA satellite rainfall data on stations data in Jambi

Author (s): Nova Susanti, Wandi, Nurhidayah, Arif Ma'rufi, Dewi Iriani and Ahmad Fudholi

Abstract: The availability of good rainfall data is a major factor in analyzing various phenomena related to rain. The rainfall data generated from the station is very accurate and reliable. However, it has various disadvantages such as incomplete data due to human error or measuring instruments, limitations in spatial resolution and availability in temporal scale. For this reason, there needs to be supporting rainfall data that can represent station data, especially in the Jambi area where good rainfall data is needed for various purposes. In this study validation of TRMM 3B42RT NASA and GSMAP JAXA satellite data on station observation data in Jambi. The method used is to compare the two satellite data with map making, graphs, and search for correlation values and RMSE to station data. After that, the best satellite data was selected to be compared with the data from 8 stations in Jambi to find out the distribution of data, graphics and the correlation and error values. From the study conducted, it was found that the rainfall value of the GSMAP JAXA satellite was closer to the station with a correlation value of 0.59 and an error of 98.75 mm/month. As for the comparison of GSMAP JAXA and data for 8 stations in the city of Jambi has a correlation range of 0.14-0.76 with an error value of 82.2- 172.27 mm/month.

Full Text

Title: Designing and wear testing of Excavator bucket teeth for the need of Indonesian mining

Author (s): R. Ismail, Z. Muhammad, J. Jamari and A. P. Bayuseno

Abstract: The Excavator bucket tooth can be damaged due to abrasive wear and impact load during it is operated in the field. This paper deals with review of wear analysis of excavators bucket tooth. Excavators examined in present study was made up of alloy steel from two branded products (ND and X). The purpose of the present work was to make the quality analysis of the bucket teeth. Results of field test for two bucket teeth product provided the actual wear volume of 31.25 cm3 /day and 36.88 cm3 /day for ND and X tooth tested respectively. Similar to Ogoshi wear test, the X bucket teeth have a value of wear volume loss higher than that of ND bucket teeth. In this test, the specific abrasion value (K1) can be used for indicating the abrasive material hardness. The comparison of the value of specific abrasion (K1) bucket teeth on the application in the field and the Ogoshi wear test is 67 %. This indicated that the X bucket teeth can even compete with ND bucket teeth products on the marketplace.

Full Text

Title:	Vortex formation in unsteady flow over NACA 4412 and NACA 4424 airfoils
Author (s):	Muhammad Irfan Hadi, Mohd. Nazri and Aslam Abdullah

Abstract: Over the years, the effects of vortex formation on the aerodynamic performance of airfoils have served as motivation for many research studies. This study takes into account NACA 4412 and NACA 4424 which are cambered airfoils. The simulations performed involve low Reynolds number air flow over the airfoils at several angles of attack. Main attention is given on the separation bubble and vortex shedding phenomena, and the effects of vortex formation on airfoils' aerodynamic performance as represented by lift and drag coefficients. Apparently, the vortex-influenced velocity curl shows alternating vortex formation along the airfoils' surfaces and at down streams. Also, the angles of attack influence such formation by developing specific separation bubbles with contrasting fixed points, in particular those along the airfoils' surfaces.

Full Text

Title:	Trade off curve of an emission economic load dispatch using NSGA-II and PVDE
Author (s):	K. Rajesh and N. Visali

Abstract: In this paper the hybrid method, Non-dominated Sorted Genetic Algorithm (NSGA-II) and Population Variant Differential Evolution (PVDE) have been placed in effect in achieving the best optimal solution of Multi objective economic emission load dispatch optimization problem. In this technique latter one is used to enforce the assigned percent of the population and the remaining with the former one. Performance and convergence characteristics are achieved with this novel technique and Diversity preserving mechanism is achieved with concept of elitism and from the tradeoff curve the best optimal solution is predicted using fuzzy set theory. This methodology is validated on IEEE 30 bus system with six generators, IEEE 118 bus system with fourteen generators with and without Valve point loading effect and with a standard forty generator test system. The solutions are dissimilitude with the existing meta heuristic methods like Strength Pareto Evolutionary Algorithm-II, Multi objective differential evolution, Multi objective Particle Swarm optimization, Fuzzy clustering particle swarm optimization, Non-dominated sorting genetic algorithm-II.

Full Text

Title:	Transport of electrolyte solutions along a plane by diffusion-osmosis
Author (s):	Hisham A. Maddah

Abstract: Diffusion-osmosis is an important electro kinetic flow mechanism in microchannels and nanochannels. In an electrolyte system, diffusion-osmosis transport results from the electrostatic interaction between a tangential concentration gradient of the electrolyte and a charged wall. The diffusion-osmotic flow of an electrolyte solution along a plane (in porous media) which is induced by the presence of a charged surface induced by the imposed electrolyte concentration gradient has been reviewed and investigated theoretically. It was assumed that there will be a constant concentration gradient imposed along the axial direction at the steady state. Electrostatic and induced potential distribution and velocity distribution of an electrolyte solution near a charged plate wall were determined from using Poisson, linearized Poisson-Boltzmann and modified Navier-Stokes equations, respectively. It was found that the normalized induced electric field approaches unity as we go far away from the EDL and normalized velocity increases with an increase in the electro-kinetic distance and approaches a constant. The effect of the induced electric field in the EDL was found to be of a dominant significance on the diffusion-osmotic flow.

Full Text

Title:	Water pump and water filter using solar-hybrid energy with mobile vehicle
Author (s):	Andrew Joewono, Rasional Sitepu and Peter R. Angka

Abstract: Sunlight in Indonesia is available quite a lot huh this is an opportunity that can be developed to produce electricity. The hybrid solar power system used is a combination of the use of electricity from the generator and a source of electricity from the conversion of solar energy. Water is also a basic need in life. Indonesia 2 climates namely, the dry season and the rainy season. During the rainy season, water is abundant, but in the dry season many areas experience drought, thus requiring water supply from the ground so that water pumps are needed to suck up the water, to be used for daily needs. The system is designed to function with a hybrid system, electrical energy from the generator and solar energy, which can automatically regulate the charging of energy to the battery and supply the load, with an effective working time of approximately 2 hours, the power used ranges from 536 to 537 watt hours, from the supply 12v 100Ah battery energy, installed in series, and has an automatic limit voltage value of 22 volts from the battery voltage. The electric energy generated is used to drive a water pump that is passed by a sediment filter, which consists of silica sand, iron removal, activated carbon and an ultra filter 1200 liters / hour to filter out impurities at the last level, so that water results are in accordance with the feasibility standard.

Full Text

Title:	Search for the optimal ratio of the initial substances of a chemical reaction based on evolutionary calculations
Author (s):	Svetlana Mustafina, Andrey Antipin, Evgenia Antipina, Elena Odinokova, Larisa Tuchkina and Sofia Mustafina

Abstract: The article is devoted to the problem of developing methods for mathematical modeling in the sphere of optimal planning in a chemical experiment. In the article, the problem of finding the optimal ratio for initial concentrations of substances is formulated in general terms and an algorithm for solving this problem is constructed basing on the method of artificial immune systems. The developed algorithm for finding the optimal initial concentrations of substances allows solving the problem of experiment planning in chemistry at the computational experiment stage. In this case, the solution of the optimization problem found with its help does not depend on the choice of the initial approximation. The algorithm was tested for industrially meaningful process of benzilidenbenzilamin synthesis for which the optimum values of the initial concentrations were calculated in order to obtain maximum yield of the reaction product.

Full Text

Title:	Design and evaluation of a multiple amplitude shift keyed bit to audio tone line encoder and decoder for ASCII character communications
Author (s):	Aaron Don M. Africa, Antonio Miguel Sarmiento Alejo, Grant Lewis Milan Bulaong, Samantha Maxine Ronquillo Santos and Jerrick Spencer Kehyeng Uy

Abstract: This paper focused on the integration of line coding and nonlinear mixing in digital communication systems. The

researcher's implementation of a bit-to-audio-tone encoder with a respective decoder. The encoder received a message from the user. The message that was inputted could be a symbol, and after it was fed into the system, it then produced audio. If the receiving end has the decoder, the audio when then be translated back to the original message. This study has benefits in the field of security systems because data can be accessed or hacked by those that have the skillset to do so. This digital communication system could be used to send information to a certain person, and since only that person has the digital decoder, only he/she can access the data. To others, the system would only produce an audio tune that would be unrecognizable by those receive it if they do not have the decoder. This research aimed to create a safer way to send and receive sensitive information without unwanted third parties to decipher it.

Full Text

Title: The potentiometric sensor for express determination of polyhexamethylene guanidine salts

Author (s): Mironyak M. O., Volnyanska O. V., Manzuk M. V., Labyak O. V., Nikolenko M. V., Kovalenko V. L., Kotok V. A. and Verbitsky V. V.

Abstract: A potentiometric sensor for the quantitative determination of polyhexamethylene guanidine salts was developed. The ionic associate of the degradation product of polyhexamethylene guanidine - hexamethylenediamine salts with heterogeneous acids with the Keggin structure was used as an electrode-active substance for the plasticized polyvinyl chloride membrane of the sensor. The anions of 12-molybdophosphate and 12-tungstenphosphate heteropolyacids were used as counterions for ionic associates. The influence of a qualitative and quantitative composition of the membrane, a type of degradation of polyhexamethylene guanidine salts, a nature of the membrane solvent-plasticizer, pH of the test solution, a presence of interfering ions in the solution on the electrode characteristics of the membrane of the developed sensor (tilt angle, minimum detectable concentration) were investigated. The optimum conditions for the quantitative determination of polyhexamethylene guanidine salts through the product of their degradation (hexamethylenediamine) by the potentiometric method with the developed sensor were established.

Full Text

Title: Research and produce fertilizer from NPK fertilizer and biochar for agricultural production

Author (s): X. A. Le, A. H. Pham, Q. V. Nguyen, T. H. Tran, T. T. T. Nguyen and B. T. Nguyen

Abstract: Biochar contains long-term and high carbon content when applied to the soil. When applying biochar to increase the ability to absorb and retain water, keep nutrition in the soil, improve the nutritional content available. Fertilizer is an important factor to increase crop productivity and soil fertility stability. However, to minimize the harm caused by excessive fertilizer use, and improve soil, this study uses NPK chemical fertilizers in combination with biochar to produce fertilizers for annual crops. The results of this study show that the production of NPK fertilizer combined with biochar will increase the price of fertilizer, whereas the increase in biochar content reduces the possibility of nitrogen loss during storage and when applied to soil. In the type of fertilizer added different biochar ratios, type NPK (5: 10: 3) added 20% biochar best suited for mass production.

Full Text

Title: Development and performance evaluation of a household manually operated citrus juice extractor

Author (s): Omolayo M. Ikumapayi, Simeon A. Babalola, Temitayo M. Azeez, Ojo P. Bodunde, Emuejevoke O. Okandeji and Sunday A. Afolalu

Abstract: A manually operated citrus juice extractor for home use was designed, fabricated and its performance evaluation was conducted on three different citrus species which are Orange fruit, Lemon fruit and Lime fruit for both peeled and unpeeled samples. Three different performance parameters were used for evaluating this prototype; they are Juice yield (%), Extraction efficiency (%) and Extraction losses (%). The performance evaluation results obtained from the experiment for the three samples (Orange, Lemon, and Lime) for both peeled and unpeeled show that Maximum juice yields for peeled and unpeeled orange, lemons and limes were obtained to be 54.5 and 55.9%, 53.4 and 59.5%, 61.5 and 66.3% respectively. While maximum extraction efficiency for peeled as well as for unpeeled oranges was obtained to be 59.2% and 69.5% respectively, highest extraction efficiency for peeled and unpeeled lemon was obtained to be 57.5 and 66.1% respectively, highest extraction efficiency for peeled and unpeeled lime was obtained to be 55.3 and 61.7% respectively. Extraction losses for peeled and unpeeled oranges were obtained to be 10.9 and 1.73% respectively, the extraction losses for peeled and unpeeled lemon was obtained to be 9.7 and 3.8% respectively, the extraction losses for peeled and unpeeled lime was obtained to be 8.8 and 4.2% respectively. Hence, unpeeled fruits showed higher juice yields for all fruits, higher extraction efficiency for all fruits and lower extraction losses for all fruits.

Full Text

Title: Reduction of reactivity fluctuation with the Euler-Maclaurin method

Author (s): Daniel Suescún-Díaz, Geraldyne Ule-Duque and D. Peña Lara

Abstract: This work presents the Euler-Maclaurin method with a first-order delay low-pass filter for reducing fluctuations in reactivity calculation. A Gaussian noise around the mean value of the measured neutron population density. This noise is simulated with different standard deviations, with a fixed seed to generate random numbers to reproduce the results. Different numerical experiments show that the proposed method offers high accuracy and low computational cost when compared to different methods reported in literature, especially when compared to the finite difference method and the FIR filter method for different forms of neutron population density.

Full Text

Title: Spatial and temporal variation of ETo for Egypt using remote sensing

Author (s): Hesham Ezz and Mohamed Abdelwares

Abstract: Egypt is adopting a horizontal agricultural expansion strategy despite facing water scarcity conditions. The agricultural expansion program will be directed towards the uncultivated lands in Egypt which can be estimated to be more than 90% of the total area. Therefore, a sustainable agricultural development is required. The most important component in the agriculture management system is the accurate estimation of the water quantities required for plantation, which is mainly controlled by the evapotranspiration value. The objective of this paper is to calculate the reference evapotranspiration (ETo) over the whole area of Egypt, which is used to calculate the irrigation water consumption, in order to give an insinuation about the suitable areas for the agricultural expansion due to the low evapotranspiration value. The average daily ETo by month is calculated using FAO Penman Monteith equation which is widely recommended due to its detailed theoretical base. The calculated ETo is demonstrated in maps using a GIS environment all over Egypt for each month. The results of ETo showed that the least mean value occurred during December which is about 3.28 mm, while the highest mean value occurred in June and equal to 9.5 mm.

Full Text

Title: Effect of joule parameter on MHD mixed convection in an open channel with semi-circular heater on the bottom wall

Author (s):   A. K. Azad, M. M. Rahman, Salma Parvin, Mahtab Uddin and M. R. Islam

Abstract: A computational study has been done to investigate the heat and fluid flow in an open channel with a semi-circular heater on the bottom wall under the effect of magnetic field. The walls of the channel are adiabatic while the semi-circular heater in the bottom wall is kept at a constant temperature. The inlet and outlet are fixed at the left and right side of the channel. The governing equations are solved by using Galerkin weighted residual finite element technique. In this investigation the involved parameters are Reynolds number, Prandtl number, Hartmann number and joule heating parameter. The effect of Reynolds number, Prandtl number and joule heating parameter for different Rayleigh numbers are investigated while the magnetic parameter Ha (Hartmann number) is kept fixed at 10. The results show that at higher Rayleigh number, joule effect parameter can be utilized to control heat and fluid flow fields. In addition, the effect of Reynolds number on the heat and flow fields becomes insignificant at higher values of Rayleigh number. Finally, Prandtl number is found to have a positive effect on heat transfer rate.

Full Text

Title: Study of the features of monitoring the rectification process during automatic control using mobile influences

Author (s):   Sheikus A. R., Kovalenko V. L., Kotok V. A., Bilobrova O. V., Fesenko K. O. and Verbitskiy V. V.

Abstract: Aim of the research was to study sensitivity to disturbances of contact devices of rectification column at different values of mobile control actions and to determine specific of changes in a number of control tray when changing feed input point. Temperature profiles were calculated for rectification column for separation of methyl tret-butyl ether (MTBE) synthesis product at different values of main process disturbance of feed flow rate. It was found that there is the region with the highest and lowest sensitivity within the apparatus, which allows for control over the process in one or few points. The reaction of each tray to disturbances in feed flow rate was studied and a number of control contact device was found based on average sensitivity. It was discovered, that when mobile control approach is used, the control point of the rectification column with the highest sensitivity to disturbances is also mobile. A dependency of control contact device number of the column on value of mobile control action was found, which lies in changes of the column's feed input point.

Full Text

Title: Performance of reactive separation process on biodiesel production

Author (s):   Yoel Pasae, Nugraha Sutikno, Lyse Bulo, Eda Lolo Allo, Titus Tandiseno and Karel Tikupadang

Abstract: The reactive separation process in the biodiesel industry is important to reduce the number of process steps so that the process becomes more economical. In this research, the Reactive Separation Process has been carried out to carry out the process of transesterification reaction between vegetable oil and methanol which is excessively stochiometric, while also carrying out the process of recovery of excess methanol from the reaction product. The parameter of the success of the Reactive Separation process is in terms of the effectiveness of the process and the quality of waste cooking oil biodiesel produced using several types of catalysts. The stages of the process carried out consisted of refining used cooking oil, catalyst preparation, transesterification reaction, recovery of excess methanol, refining biodiesel, and testing the characteristics of biodiesel. Based on the acquisition of biodiesel and recovery of methanol produced from this research, it shows that the effective reactive separation process is used for biodiesel production; however some of the characteristics of biodiesel produced still need to be increased until all of them meet the standards set in the Indonesian National Standard.

Full Text

Title: Seismoacoustic research of Lake Bannoe bottom sediments (South Ural, Russia)

Author (s):   Krylov P. S., Nurgaliev D. K., Yasonov P. G., Dautov A. N., Golovtsov A. V., Sitdikov R. N. and Krylova A. S.

Abstract: This paper concerns the application of seismoacoustic surveying in the study of bottom sediments of Lake Bannoe, one of the lakes investigated as a part of grant 18-17-00251 of Russian Science Foundation. High-resolution seismoacoustic profiling allows remote characterization of lake sediments stratigraphy due to the recordings of acoustic waves reflected from the lake bottom. The record from bottom sediments reveals thickness of more than 6 meters where bedrocks are not possible to determine as well. This could be a result of greater thickness of sediments containing gas bubbles. However, it is clearly seen an increase in depth and decrease in sediment thickness towards the southeast.

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DESIGNING AND WEAR TESTING OF EXCAVATOR BUCKET TEETH FOR THE NEED OF INDONESIAN MINING

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ABSTRACT

The Excavator bucket tooth can be damaged due to abrasive wear and impact load after it has been operated in the field. This paper deals with a review of wear analysis of excavator bucket tooth. Excavators examined in the present study was made up of alloy steel from two branded products (ND and X). The purpose of the present work was to make a quality analysis of those bucket teeth products. Results of field test for two bucket teeth product provided the actual wear volume of 31.25 cm3 /day and 36.88 cm3 /day for ND and X tooth tested respectively. Similar to Ogoshi wear test, the X bucket teeth have a value of wear volume loss higher than that of ND bucket teeth. In this test, the specific abrasion value (K1) can be used for indicating the abrasive material hardness. The comparison of the value of specific abrasion (K1) bucket teeth on the application in the field and the Ogoshi wear test is 67 %. This suggested that the X bucket teeth can still compete with ND bucket teeth products on the marketplace.

Keywords: bucket teeth, wear, ogoshi test, field test, abrasion value.

INTRODUCTION

Wear can be suffered on excavator bucket teeth as a result of the prolonged frictional interaction between its surfaces contacting with soil in relative motion during mining processes which subsequently control its life span (Patel and Prajapati, 2012). Also, this condition may include impact, abrasion, fretting, and chemical action. Wear has become a critical issue in mining industries because it can make the premature failure of the bucket teeth and needs a replacement with new component (Diaz Lankenau *et al*., 2012; Fernández *et al.*, 2001; Patel and Prajapati, 2012; Wulpi, 2013). When replacement of this component has been very often due to wear, it can make a reduction in productivity. Accordingly, the friction and wear of bucket teeth have received much attention through a fundamental understanding of mechanism wear on the tooth surface (Chattopadhyay, 2001). In this way, the use of material characterization of the tooth surfaces during and after wear test can understand a transitional wear behavior of the final state.

Further, the excavator bucket teeth commonly undergo the dynamic of wear processes on which material characteristics of bucket teeth should have good strength and surface hardness. Accordingly, the teeth are often made of steel, which has a good hardness and toughness, and also it can work under the influence of complex process with loading and unloading periods (Cires and Nani, 2016; Peurifoy and Ledbetter, 1985). In order to withstand abrasive elements, steel can be improved by surface coating since it has good weldability on which the good choice of the base tooth material is for easy coating application (Sarkar *et al*., 2015; Singla *et al*., 2014). For example, steel alloys containing Cr, V and Nb could be welded onto the steel surface. Additionally, a ferrite matrix with tungsten carbide is weldable and can be employed a coating material with varying forms and sizes of a tooth. Nevertheless, under load, the teeth coated with hardened materials may be subjected to cracks propagating through the thickness of the coating or interfacial de-

cohesion which leads to failures. Thus, a low cost of an excavator's tooth has been proposed to employ a medium carbon steel casting in a sand mold and could be subsequently heat treated to modify microstructures and mechanical properties (Singla *et al*., 2014).

In particular, the heat treatment in steel can play an important role in modifying the microstructure. Steel could be treated through applying phase transformation during heating and cooling, which eventually make the change of a microstructure in the solid state. Correspondingly, two processing approaches of heat treatment could be adopted, namely (i) thermo-mechanical treatments for improving the mechanical property and microstructure, and (ii) thermochemical treatments for tailoring the chemistry and microstructure of the surface material. In traditional thermo-mechanical treatments, steel is initially heated to reach an austenitizing temperature and hold it for a certain time and then cooled by water or oil quenching. The austenitizing temperature of the heating matrix could be in the range of 750 to 950 ^{O}C depending on the carbon content of the steel. In this way, heating of the sample must be performed slowly to prevent cracking or cracking temperature (Diaz Lankenau *et al*., 2012; Fernández *et al*., 2001; Patel and Prajapati, 2012; Wulpi, 2013; Singla *et al*., 2014). Whereas, cooling should be undertaken by quenching for minimizing the carbides. Here the heat treatment on casting product of excavator teeth requires the right selection of surface treatment which could provide a good wear performance with the least expensive method. Hereby optimizing heat treatment parameters ensures the surface hardness to meet the standard of component performance, which eventually provides the competitive costs of the products (Bayer, 2004).

Since the bucket teeth are frequently exposed to heavy wear, it needs an evaluation of wear properties in term of laboratory and field test to avoid costly downtime and reduce the cost of the product. Correspondingly, laboratory wear experiments of the bucket teeth could be

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DESIGN OF UNPAVED ROADS WITH DACE® SOFTWARE

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ABSTRACT

In this article, we introduce DACE® software as an alternative of computational calculation for the design of unpaved roads, using the semi-empirical methods of Giroud, Han and Pokharel, which were published in 2004 and 2015. As a conclusion, the use of the Hypertext Preprocessor (Php) programming language, applied in order to develop DACE®, allows it to be cross-platform software since it is a web application, therefore, it works in all operating systems. Furthermore, the results obtained using DACE®, were satisfactorily validated with the exercise proposed by Han and Pokharel in 2015, therefore, it allows to determine the thicknesses of unreinforced unpaved roads (without geosynthetic), with geotextile (woven geotextile), biaxial geogrid and geocell. Lastly, DACE® is a software that will help estimate the thickness of an unreinforced unpaved road (without geosynthetic), with geotextile (woven geotextile), biaxial geogrid and geocell, whenever the subgrades have a California Bearing Ratio of the sub-grade soil (CBRs) value equal to or less than 3% and a reliability value of 50%. In addition, it is possible to apply similar thicknesses in-situ of the specimens of the CBR and modified proctor tests.

Keywords: software, unpaved, road, design, CBR, unreinforced, woven geotextile, biaxial geogrid, geocell, DACE®.

1. INTRODUCTION

The problem studied is the design of unpaved roads, which is a topic that became important in the 70s with the project 3782-65 "thickness requirements for unsurfaced roads and airfields" of U.S. Army Engineer Waterways Experimental Station [1]. Currently, the semi empirical methods proposed by Giroud, Han and Pokharel in 2004 and 2015 [2] [3] [4] [5] [6] [7] are used.

The design of unpaved roads has evolved from conventional to special, distinguishing the calculation of thicknesses of compacted granular materials without geosynthetic reinforcement from the calculation with reinforcement, such as: woven geotextile, biaxial geogrid, and geocell [8]. Hence, the importance of estimating the design of the thicknesses using a calculation software [9] [10], since the current formulation is nonlinear. The DACE® software was developed for this task, which by its Spanish acronym means -Diseño de Afirmados Convencionales y Especiales DACE®-, which can be executed on a computer, tablet or smartphone, with internet access.

2. METHODS

2.1 Semiempirical methods.

The semiempirical methods are useful for the design of unpaved roads, it has been based on the concepts of bearing failure and an increase of bearing capacity by the use of geosynthetics [11] [12] [6]. Currently, a recent method for calculating the thickness of unpaved roads without reinforcement, with woven geotextile or with biaxial geogrid is shown in Equation (1), as proposed by Giroud and Han in 2004. Furthermore, for unpaved roads with geocell, Equation (2) is applied, which was developed in 2015 by Han and Pokharel, this equation was developed from the calibration of the Equation (1) [7].

Both formulations are used for a subgrade with a California Bearing Ratio of the sub-grade soil (CBR_s) equal to or less than 3%, and a reliability value of 50% [2] [3] [7]. Furthermore, the equations were estimated from the results of accelerated pavement testing of unpaved road sections and large-scale plate loading test in the geotechnical test box [13].

$$\frac{1}{a} = \frac{0.868 + (0.661 - 1.006 * J_a^2) * \left(\frac{a}{h_{base}}\right)^{1.5} * log(N_a)}{f_E} * \left[\sqrt{\frac{P}{\left(\frac{S}{f_{sl}}\right) * \left\{ 1 - 0.9 * e^{\left[-\left(\frac{a}{h_{base}}\right)^2\right]} \right\} * N_c * Cu * \pi * a^2}} - 1 \right] * \frac{1}{h_{base}} \tag{1}$$

$$\frac{1}{a} = \frac{0.868 + 0.52 * \left(\frac{a}{h_{base}}\right)^{1.5} * log(N_a)}{f_E} * \left[\sqrt{\frac{P}{\left(\frac{S}{f_{sl}}\right) * \left\{ 1 - 0.9 * e^{\left[-\left(\frac{a}{h_{base}}\right)^2\right]} \right\} * N_c * Cu * \pi * a^2}} - 1 \right] * \frac{1}{h_{base}} \tag{2}$$

TRADEOFF CURVE OF AN ECONOMIC EMISSION LOAD DISPATCH USING NSGA-II and PVDE

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ABSTRACT

In this paper a new hybrid method is proposed for nonlinear constrained environmental economic load dispatch problem which is the combination of Non-dominated Sorting Genetic Algorithm (NSGA-II) and Population Variant Differential Evolution (PVDE) algorithm methods. The hybrid method is employed to evaluate the optimal solution for optimization problem which is incorporated with two contradictory objectives of minimizing cost and emission. To overcome the premature convergence in an optimization problem diversity preserving mechanism is employed with concept of elitism. Fuzzy set theory is employed to achieve the optimal solution from the tradeoff curve and tested for different systems. The hybrid method is applied for different cases and results are compared with the existing methods like MODE, MOPSO, FCPSO, SPEA-II, and NSGA-II.

Keywords: multiobjective function, cost function, economic load dispatch, trade off curve.

1. INTRODUCTION

Reaching the goal of load demand with the scheduling of committed generating units with minimum fuel cost satisfying equality and inequality constraints is the objective of economic load dispatch. With the incorporation of emission objective according to the clean air act amendments in 1990[1] many of the researchers concentrated on single objective economic load dispatch as a multiobjective function represents environmental economic load dispatch (EED). Emission objective enhanced the complexity of the optimization problem with many equality and inequality constraints. To achieve optimal solution for the nonlinear multiobjective optimization problem many methods such as classical methods, heuristic method, metaheuristic methods and hybrid methods are applied. Some of the conventional methods such as Linear Programming technique [2] considered as single objective optimization problem with lot of assumptions and doesn't provide the easy approach. With another approach [3] conversion of multiobjective function to mono objective function is implemented by using suitable weights and drawback associated with this method, it requires multiple runs to get the tradeoff curve. To overcome this difficulty ε constraint method was developed [4], considering other objective as a constraint with its limitation of ε levels, but this is a time consuming process with the production of weak nondominated solutions. Later a novel method fuzzy optimization technique [5] was applied but due to lack of composition in direct search towards the tradeoff curve and hence it was not preferred. A fuzzy satisfaction maximizing decision making [6] implemented satisfactorily but the extension of objectives has become a tedious process. A novel approach is introduced [7] which is a formidable and exhibiting untimely convergence characteristic.

Recent methods employing Evolutionary Algorithms (EA) for solving EELD problems eliminating the downside of the classical methods to obtain pareto set. These algorithms are based on the population which generates optimal solution on single run and has its own merits. Non-dominated Sorting Genetic Algorithm [8] is applied which exhibited the suboptimal solution of result and consuming more time for the evaluation. NSGA-II [9] exhibits elitism, ranking but fails in its uniformity of the tradeoff, and this can be overcome using dynamic crowding distance method and more MOEAs such as Strength Pareto Evolutionary Algorithm [10], Niched Pareto Genetic Algorithm [11], Multiobjective Particle Swarm Optimization [12], Multiobjective Differential Evolution [13]. In a MOEA a set of solutions are obtained, which utilizes the fuzzy set theory to achieve best solution.

Combining two or more algorithms is referred as hybridization which is a successful approach in solving environmental economic load dispatch. The main objective of hybrid method is to provide diversified pareto front. In this paper a hybrid method which uses with the combination of PVDE and NSGA-II is presented and in the initial stage half of the population is carried by NSGA-II where non-dominated sorting is implemented, dynamic crowding distance is evaluated for the generation of offspring's and remaining half of the population is refreshed based on the concept of interquartile range to eliminate immovable local optima using PVDE and corresponding offspring's is generated. This hybrid method is tested on IEEE 30 bus system with six generators with and without losses and IEEE 118 bus system with fourteen generators with and without valve point loading effect and standard forty generators system, with less number of iterations. The remaining paper is organised as follows: section 2 related to mathematical formulation of EELD, section 3 explains on multiobjective optimization, section 4 presents brief discussion on PVDE and hybrid method and section 5 results are presented for three test cases which shows better performance and compared to existing methods reported in the literature and section 6 presents the conclusion on hybrid method.

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DESIGN AND EVALUATION OF A MULTIPLE AMPLITUDE SHIFT KEYED BIT TO AUDIO TONE LINE ENCODER AND DECODER FOR ASCII CHARACTER COMMUNICATIONS

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ABSTRACT

This paper focused on the integration of line coding and nonlinear mixing in digital communication systems. The researcher's implementation of a bit-to-audio-tone encoder with a respective decoder. The encoder received a message from the user. The message that was inputted could be a symbol, and after it was fed into the system, it then produced audio. If the receiving end has the decoder, the audio when then be translated back to the original message. This study has benefits in the field of security systems because data can be accessed or hacked by those that have the skillset to do so. This digital communication system could be used to send information to a certain person, and since only that person has the digital decoder, only he/she can access the data. To others, the system would only produce an audio tune that would be unrecognizable by those receive it if they do not have the decoder. This research aimed to create a safer way to send and receive sensitive information without unwanted third parties to decipher it.

Keywords: line coding, spectrum analysis, non-linear mixing, synchronization, additive white Gaussian white noise, beat frequency.

1. INTRODUCTION

Digital baseband modulation or digital transmission method used on digital data transport was also called line coding systems. Different type of coded system delivered a varied reliable digital data transmission when baseband channels were used. The three branches of line encoded systems that were commonly used were divided into three different categories, unipolar encoding, bipolar encoding, and polar encoding. Other types of encoders employed made use of the frequency spectrum when the signal was modulated. Some examples of these encoders include amplitude shift keying and frequency shift keying that allowed the use of frequency to control the transmitted data. Also, other forms of information transmission include both amplitude and frequency shifting like Quadrature phase shift keying. Different types of modulation allowed the transmitted data to be received with reliability. When digital transmission systems transmit data, the reliability of the system was considered as one of the principal parts of a system for the information to be protected [1].

In this paper, a novel multiple bit-to-audio-tone encoder and decoder was presented. This designed system encompassed a unipolar system with a shifted keyed component for the frequencies that were used to transmit the given ASCII code. The eight-bit ASCII code that was used determined the bandwidth as well as the frequencies that were introduced into the system for transmission. Similarly, the receiver interpreted this data and translated the signal into the original code.

2. BACKGROUND OF THE STUDY

Digital Communications, a form of communication used to transmit data by encoding the information as a discrete signal, has multiple functions in everyday living. This mode of information transfer has allowed easy access to data from the transceiver to the receiver in a small amount of time. The data could be in the form of an image, audio, or video. There has already been plenty of research on speech-coding models through encoding and decoding. A research on the speech-coding systems focused on encoding an audio input through a 1300 bps sinusoidal encoder was able to show that the original message that was retrieved in the decoder was of acceptable quality and intelligibility [2]. The purpose of transmitting these forms of data was to increase efficiency in data transfer, but a feature that was added in several studies was the bit-to-audio-tone encoder. The purpose of adding such a feature into the already functioning system was to create a more efficient and safer means of message propagation. This study was pursued because it allowed the exploration of the different functions of a bit-to-audio line encoder and decoder that may have not already been discovered. Through this study, other applications that would be beneficial in the field of engineering could be applied in military-grade operations or to provide a safer network that is inaccessible to hackers.

In the transmission of digital communications, the main goal was to relay the information signal at its best meaning that there were no alterations in the original message, and the receiver would ultimately obtain the transmitted signal without discrepancies. This required the usage of a filter that would remove excess noise that attenuated the signal's strength and reduced its clarity. For this certain study, the researchers decided to add Additive White Gaussian Noise (AWGN) into the communication system. This was because the transmitter needed to mask the original message with something to prevent others