



EXTRACTION OF PHENOLIC COMPOUNDS FROM GREEN TEA USING ETHANOL

Puguh Setyoprato

Chemical Engineering Department, University of Surabaya Jl. Raya Kalirungkut, Surabaya, Indonesia

E-Mail: puguh_sptm@yahoo.com

ABSTRACT

Ethanol was used as a solvent to extract phenolic compounds from dried fresh tea leaves (*Camellia sinensis* L. Kuntze). The extraction was performed at temperature of 40, 50, and 60 °C which was maintained using a water bath. Folin-Ciocalteu's reagent was used to determine the total phenolic content spectrophotometrically and gallic acid was used as the calibrant. The highest yield, which was 0.3347 g extract/g dry tea leaves, was obtained at extraction temperature 60 °C and extraction time 240 minutes. While the lowest yield, which was 0.2807 g extract/g dry tea leaves, was obtained at temperature 40 °C and 15 minutes extraction time. The value of total phenolic content obtained in this work is between 0.21 - 0.25 mg GAE/mg extract. The study also demonstrated that the extraction of tea leaves with ethanol at relatively low temperature exhibit considerable efficient method to obtain extract with relatively high total phenolic content.

Keywords: ethanol, extraction, green tea, phenolic.

INTRODUCTION

Tea as an important natural source of phenolics

The *Camellia sinensis* (L.) Kuntze (family Theaceae) is tea plant which can grow in many countries worldwide. It will grow best in areas with considerable rainfall, good trenches, and soil that is slightly acidic, such as in tropical and subtropical area. It found two varieties of tea, i.e. *C. sinensis* var. *sinensis* (China tea) is widely planted in China, Japan, and Taiwan, while *C. sinensis* var. *assamica* (Assam tea) grows rapidly in south and Southeast Asia, and more recently, Australia [1].

The major component (cover 90% dry weight of phenolic) of total phenolic compounds in tea leaves is composed of flavonoids, in which flavan-3-ols (catechins) become the major constituent, which cover up to 30% of their dry weight. On the basis of the stereochemical configuration of the 3', 4'-dihydroxyphenyl and hydroxyl groups at the 2- and 3-positions of the C-ring, catechins can be categorized to two isomers: trans-catechins and cis-epicatechins. Both of them exists as two optical isomers: (+)-catechin and (-)-catechin and (-)-epicatechin and (+)-epicatechin, respectively. While, (-)-catechin can be converted by esterification with gallic acid to produce the esterified or galloyl catechins: (-)-catechin-3-gallate, (-)-epicatechin-3-gallate, (-)-epigallocatechin-3-gallate and (-)-gallocatechin-3-gallate [2], [3].

Tea classification

Besides coffee and cocoa, tea also has been known as a popular beverage since a long time ago. Tea is consumed for daily drinking in about 160 [4]. Base on the processing method where degrees of fermentation become one of the most importance parameter, mostly teas are classified into three main groups, i.e.: green teas (unfermented tea), semi-fermented teas (Oolong teas), and completely-fermented tea (black teas), which represent for 24%, 1%, and 75% of the total tea production in the world, respectively [5], [6], [7]. Meanwhile there is another

grouping which classified tea into six groups including black tea, green tea, Oolong tea, yellow tea, white tea, and dark compressed tea [8].

To avoid oxidation, green tea is treated via steaming, roasting, or drying of the tea leaves. Because of its high catechin content which has a very good health impact, green tea is well known as the most popular tea worldwide among those other types of teas. Some of these favourable health effects are its role as antioxidant, anticarcinogenic, antimutagenic, anti-inflammatory and antimicrobial. Therefore, on the nutraceutical and health market, various forms of end products of green tea drinks are become increasingly well-known and popular everywhere [8].

Tea phenolic compounds, which was also known as tea polyphenols (TPs) have been adopted as the main quality parameters or indicators of tea products. Theaflavins are the first stable component produced by oxidation during fermentation. It's produced during the oxidation of catechin and catechin gallates. During fermentation, it experience further oxidation to form more polymerized thearubigins. Theaflavins cause the brisk and astringent taste and bright golden colour to black tea quality, while thearubigins cause the reddish colour and richness in taste. On the other hand, theabrownins endows tea liquor and leaf with a dark brown colour, which has a negative effect on tea quality [2].

Green tea contains more content of tea polyphenols than oolong and black tea, mainly flavanols. To promote consumption, green tea extracts have been manufactured in various types of cans or bottles. However, in the process of beverage production, production of green tea was in fact more complicated than that of oolong or black tea [9]. The decrease in sensory qualities, including color, flavor and taste, during heat processing has limited the development of green tea beverage products [10]. Moreover, it has been reported that tea polyphenols are sensitive to heat as they are vulnerable to decomposition and isomerization during heat processing, especially for



epigallocatechin and epigallocatechin gallate [11], [12], [13]. If heat is introduced, epigallocatechin gallate (EGCG), epigallocatechin (EGC), epicatechin (EC) and epicatechin gallate (ECG) partially epimerized, then consequently concentration of total catechins decreased [14].

The potential health effect of tea polyphenols

Normal consumption of tea involves brewing the leaves and then consuming the liquor hot or cold. Furthermore, in order to promote the health benefits of tea consumption, besides become popular beverages, tea are also developed in regard with their pharmaceutical and industrial applications [15]. Tea is also often found to be used as an ingredient in various food recipes [16].

It has been known that the health impact associated with tea consumption is in part to the antioxidant and free radical-scavenging activity of the most abundant tea flavonols [17]. Considering the health-benefit effects of the green tea extract, including antioxidative [18], [19], anticancer [20], antimicrobial [21], reducing cardiovascular diseases [22], anti-inflammatory [23], [24], the consumption of green tea is rapidly increasing.

MATERIAL AND METHODE

Fresh tea leaves (*Camellia sinensis* L. Kuntze) were obtained from tea gardens in the region of PT Perkebunan Nusantara (PTPN) XII Lawang, Malang, East Java, which is located at an altitude of 950-1250 above sea level and at ambient temperatures ranging from 19-25 degrees Celsius. Fresh tea leaves are cleaned of impurities and then drained. Folin Ciocalteu reagent, Na_2CO_3 , catechin monohydrate, sodium nitrite, aluminum chloride, sodium hydroxide, Cab-O-Sil and ethanol 90% were purchased from merck.

Fresh tea leaves were sorted and washed, and then were dried in an oven at 100 °C. The drying rate was observed by weighing the sample using analytical balance every 20 minutes until a constant weight. Certain amount the dried tea leaves (as much as 358 grams) was then weighed and was inserted in a sealed plastic bag prior to further treatment.

The dried tea leaves were crushed in a blender and then sieved using 70/100 mesh sieve-set. Extraction was performed in 250 ml erlenmeyer flasks by mixing 120 ml of 20% ethanol and 4 grams of dried tea leaves powder. Extraction is done in a water bath at a temperature of 40, 50 and 60 °C. The extract was separated by filtration and then evaporates the liquid in an oven at temperature of 50 °C to obtain concentrate. The concentrate then was dried by adding Cab-O-Sil powder to form granules. The granules were then put in an oven at a temperature of 50 °C over night to obtain dry granules. The extract content was calculated as follow:

$$\text{weight of extract} = (\text{weight of dry granule}) - (\text{weight of Cab - O - sil}) \quad (1)$$

Total phenolic content (TP) was determined spectrophotometrically using Folin-Ciocalteu's reagent according to a modified method of Gordana Rusak, Draz'enka Komes, Saša Likic', Dunja Horz'ic', and Maja Kovac, 2008 [17]. The method is based on the reduction of phosphotungstic acid ($\text{H}_3\text{P} [\text{W}_3\text{O}_{10}]_4$ in alkaline solution to phosphotungstic blue (based on $\text{WO}_2 \cdot n\text{WO}_3$). The value of absorbance which was influenced by the formed phosphotungstic blue is directly proportional to the number of aromatic phenolic groups in the sample and is used for their determination, expressed as gallic acid equivalent [17].

The procedure during the determination of phenolic in the sample is as follow: 0.5 ml of the sample was poured into a 50 ml volumetric flask containing 2.5 ml of Folin-Ciocalteu's reagent, 30 ml of distilled water and 7.5 ml of 20% Na_2CO_3 , and the volume was made up with distilled water. During the oxidation of phenolic compounds, phosphomolybdc and phosphotungstic acid, contained in the Folin-Ciocalteu's reagent, were reduced to blue-coloured molybdenum and tungsten oxides. After two hours, the absorbance of blue colouration was measured using UV-VIS spectrofotometer (Hitachi U-2000) at 765 nm against a blank sample. In this work, gallic acid was used as the standard, therefore the results was expressed as mg gallic acid equivalent (GAE)/ mg extract.

RESULTS AND DISCUSSIONS

The drying profile

During manufacturing of green tea extract, the first step is drying of the tea leaves. In this step, the drying process is aimed to reduce the moisture content to certain level where the contamination of green tea extract product by certain substance produced by microbial activities can be avoided. Besides, the drying of fresh tea leaves will destroy the existing wax layer on the outer surface of the leaves and will further break down the cell walls so that it will facilitate the solvent compounds to diffuse easily during the extraction process. Furthermore, tea drying will prevent the tea from oxidizing then the green tea product is a product that is protected from oxidative damage.

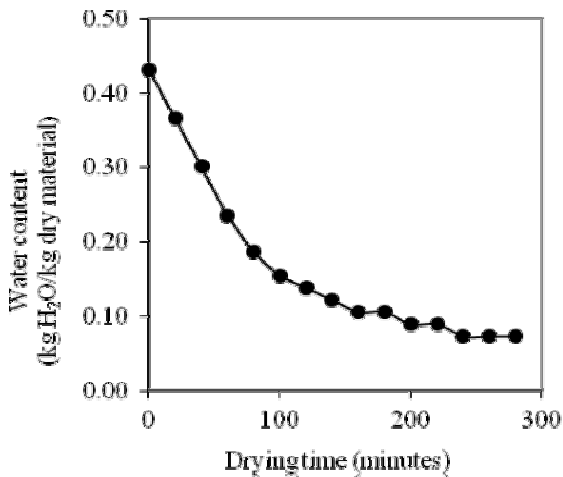


Figure-1. Plot of the water content versus the drying time.

To avoid quality degradation, the drying temperature is maintained at 100 °C. A maximum tea particle temperature of less than 100 °C is important for tea quality [25]. The hot drying air removes moisture from the core of the tea leaves by diffusion process [26]. The drying process is also aimed to arrest the fermentation process. The final moisture content of below 7% w.b. is a crucial aspect to get the stable product quality for preservation. There are some drying methods which can be applied for tea leaves drying including thermal drying methods (microwave-, oven-, and sun-drying) and non-thermal drying methods (air- and freeze-drying), thermal drying, however, also resulted in declines in total phenolic content [27].

In this work, the drying profile which was expressed as the reduction of water content (kg H₂O/kg dry tea leaves) along with the drying time was shown on Figure-1. The first 90 minutes drying show a relatively constant rate drying, which was revealed by the relatively straight line of the profile. It indicate that during this first period the drying was controlled by external heat transfer to the material surface. While after the first period, the drying profile form the non linier line which indicate that the falling rate of drying was happen. During the falling rate diffusion of moisture within the material is control the overall drying process.

The extract yield

Different solvents, namely, dichloromethane, ethyl acetate, acetone, acetonitrile, methanol and ethanol have been used by many researchers to extract the phenolic compounds from dried biomaterial. The existing analytical methods which usually use for quantifying the biologically active compounds present in tea leaves consisting of extraction, separation and analysis. Numerous extraction conditions and analysis methods have been applied, resulting in a wide variation in the level of measured concentrations of tea compounds. From many previous studies that have been conducted showed that aqueous ethanol was to be the most effective extraction

solvent in prolonged extraction for tea leaves [17], [28]. For this reason, in this research work ethanol was used as solvent for the extraction. Four grams of dried green tea leaves were extracted with 120 ml of 20% ethanol in 250 ml Erlenmeyer flask equipped with a reflux condenser.

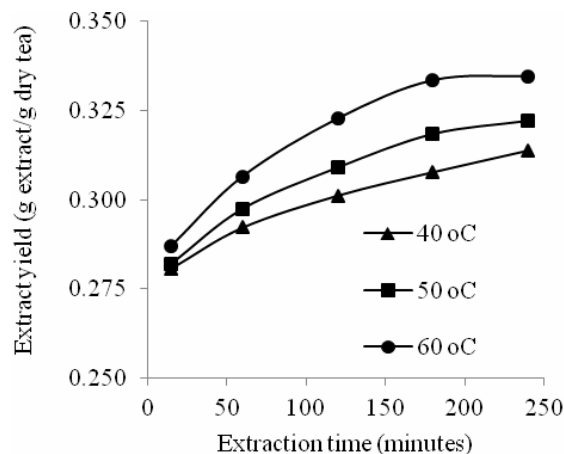


Figure-2. Plot of the extract yield versus the extraction time.

In order to increase the solubility of tea polyphenols and the rate of mass transfer, the conventional extraction technique is commonly carried out by heating, boiling, or refluxing. Most of researcher agrees that many components in tea, such as volatile components, polyphenols, etc., are thermally unstable and could degrade when expose to the heat during thermal extraction. Moreover, processing at high temperature could increase the extraction of protein and pectin; this causes the degradation of the quality of green tea extracts [29]. For this reason, processing in a shorter time and at lower temperature is favorable.

To prevent the degradation of the thermally unstable components when it exposed at high temperature, extraction at temperature of 40, 50 and 60 °C was applied in this work. The extraction result which was expressed as extraction yield along the experiment was shown in Figure-2. It can be seen from the Figure that higher extraction temperature resulted in a significant increase of the extraction yield. Besides, the result also clarified that the extraction time played an important role in the extraction process. Green tea is rich in phenolic compounds and the extraction efficiency of these compounds strongly depends on the time of extraction and the solvents used [17]. The addition of Cab-O-Sil powder acts as an adsorbent that will absorb the excess of the water in the liquid extract of tea leaves.

The highest yield, which was 0.3347 g extract/g dry tea leaves, was obtained at extraction temperature 60 °C and extraction time 240 minutes. While the lowest yield, which was 0.2807 g extract/g dry tea leaves, was obtained at extraction temperature 40 °C and extraction time 15 minutes. This result was comparable with green



tea extraction done by Amra Perva-Uzunalic's *et al.* [30] which obtain extraction yield 28 - 34% using ethanol as much as 25 - 100 %vol at temperature of its boiling point. The active ingredients contained in green tea, mainly catechins and caffeine, are usually isolated by extraction with organic solvents, in this case the extraction conditions, such as solvent type, temperature, time, pH, ratio of solvent to material, variously influence the efficiency and quality of the green tea extract [30].

Total phenolic content in extract

The total phenolic content obtained from ethanol extraction at different temperature was shown in Figure-3, where the value is between 0.21 - 0.25 mg GAE/mg extract. The dependency of total phenolic content on extraction temperature is in accordance with the same dependency of the extract yield. It indicate that the main component in the green tea extract is phenolic compound.

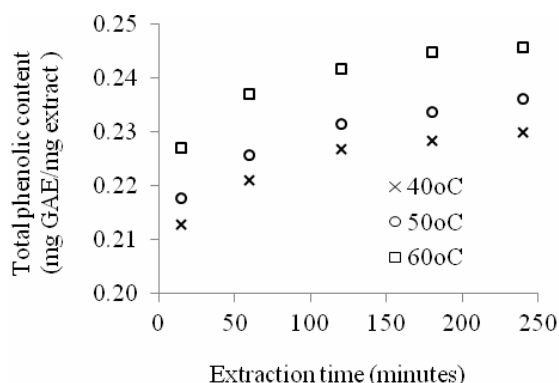


Figure-3. Total phenolic content expressed as galic acid equivalent (GAE) versus extraction time.

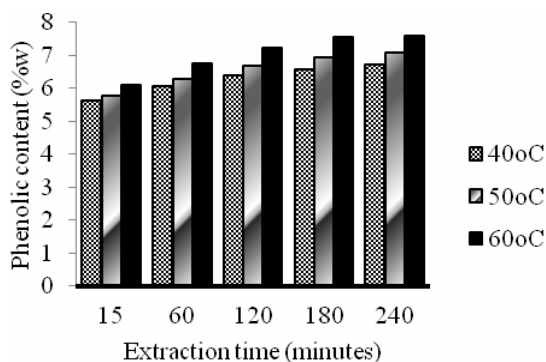


Figure-4. Plot of the phenolic content (%w) versus extraction time.

Catechins and their gallates are the main phenolic compounds in unfermented fresh tea leaves [31], which may constitute up to 30% of dry weight. Principal catechins of young tea leaves are epigallocatechin gallate (EGCG), epigallocatechin (EGC), epicatechin gallate (ECG), gallic catechin (GC), epicatechin (EC) and catechin

(E.W.C. Chan, 2007). The content of catechins in tea leaf have been reported to be influenced by a number of factors, including season, climate, elevation, agricultural practices, leaf maturity, processing methods, manufacturing practices and storage [31].

The total phenolic content can also be expressed in percent weight of the dry tea leaves such as expressed in Figure-4 where the obtained total phenolic content value is between 5.6 - 7.6 %w. These values agree well with work result by Shiromani Jayasekera, Lovdeep Kaur, Abdul-Lateef Molan, Manohar L. Garg, and Paul J. Moughan (2014) which reported that total catechins in the aqueous extracts from unfermented teas were in the range of 8.4 - 12.1 %w [31]. Extraction of total phenolic content of green tea with various solvent including acetone, methanol, acetonitrile and water (concentration from 25% - 100%) resulted in phenolic content ranged from 5.8 - 569 g/kg dry extract [32].

CONCLUSIONS

Ethanol showed high extraction efficiency for fresh tea leaves. This work has confirmed that green tea is a rich source of phenolics compounds. Higher extraction temperature resulted in a significant increase of the extraction yield. Besides, the result also clarified that the extraction time played an important role in the extraction process. The determination of total phenolic content and the extract yield has confirmed that the main component in the green tea extract is phenolic compound. The study also demonstrated that the extraction of tea leaves with ethanol at relatively low temperature exhibit considerable efficient method to obtain green tea extract with relatively high total phenolic content.

REFERENCES

- [1] E.W.C. Chan, Y.Y. Lim, Y.L. Chew. 2007. Antioxidant activity of *Camellia sinensis* leaves and tea from a lowland plantation in Malaysia. *Food Chemistry*. 102: 1214-1222.
- [2] Yao L.H., Jiang Y. M., Caffin N., Arcy B. D., Datta N., Liu X., Singanusong R. and Xu Y. 2006. Phenolic compounds in tea from Australian supermarkets. *Food Chemistry*. 96: 614-620.
- [3] Friedman M., Kim S.-Y., Lee S.-J., Han G.-P., Han J.-S., Lee K.-R. and Kozukue N. 2005. Distribution of catechins, theaflavins, caffeine, and theobromine in 77 teas consumed in the United States. *Journal of Food Science*. 70: 550-559.
- [4] An B.J., Kwak J.H., Son J.H., Park J.M., Lee J.Y., Jo C. 2004. Biological and antimicrobial activity of irradiated green tea polyphenols. *Food Chemistry*. 88: 549-555.



- [5] Krishnan R. and Maru G.B. 2006. Isolation and analyses of polymeric polyphenol fractions from black tea. *Food Chemistry*. 94: 331-340.
- [6] Park H.S., Choi H.K., Lee S.J., Park K.W., Choi S.G., Kim K.H. 2007. Effect of mass transfer on the removal of caffeine from green tea by supercritical carbon dioxide. *The Journal of Supercritical Fluids*. 42: 205-211.
- [7] Hsieh M.H. and Chen S.M. 2007. Determination of amino acids in tea leaves and beverages using capillary electrophoresis with light-emitting diode-induced fluorescence detection. *Talanta*. 73: 326-331.
- [8] Labbé D., *et al.* 2008. Catechin stability of EGC- and EGCG-enriched tea drinks produced by a two-step extraction procedure. *Food Chemistry*. 111: 139-143.
- [9] Zhao W., Yang R., *et al.* 2008. Effect of PEF on microbial inactivation and physical-chemical properties of green tea extracts. *LWT*. 41: 425-431.
- [10] Wang L. F., Kim D. M. and Chang L. Y. 2000. Effects of heat processing and storage on flavanols and sensory qualities of green tea beverage. *Journal of Agriculture and Food Chemistry*. 48: 4227-4232.
- [11] Kinugasa H. and Takeo T. 1990. Deterioration mechanism for tea infusion aroma by retort pasteurization. *Agriculture and Biology Chemistry*. 54: 2537-2547.
- [12] Zhu Q.-Y. 1997. Stability of green tea catechins. *Journal of Agriculture and Food Chemistry*. 45: 4624-4628.
- [13] Chen Z.-Y. 1998. Stabilizing effect of ascorbic acid on green tea catechins. *Journal of Agriculture and Food Chemistry*. 46: 2512-2516.
- [14] Kim E.S. 2007. Impact of heating on chemical compositions of green tea liquor. *Food Chemistry*. 103: 1263-1267.
- [15] Wang L.F., Lee J.Y., *et al.* 2008. Discrimination of teas with different degrees of fermentation by SPME-GC analysis of the characteristic volatile flavour compounds. *Food Chemistry*. 109: 196-206.
- [16] Polat M. and Korkmaz M. 2008. Detection of irradiated black tea (*Camellia sinensis*) and rooibos tea (*Aspalathus linearis*) by ESR spectroscopy. *Food Chemistry*. 107: 956-961.
- [17] Rusak G., *et al.* 2008. Phenolic content and antioxidative capacity of green and white tea extracts depending on extraction conditions and the solvent used. *Food Chemistry*. 110: 852-858.
- [18] Liu Z.Q., Ma L.P., *et al.* 2000. Antioxidative effects of green tea polyphenols on free radical initiated and photosensitized peroxidation of human low density lipoprotein. *Chemistry and Physics of Lipids*. 106: 53-63.
- [19] Tsai T.H., *et al.* 2008. In vitro antimicrobial activities against cariogenic streptococci and their antioxidant capacities: A comparative study of green tea versus different herbs. *Food Chemistry*. 110: 859-864.
- [20] Kuzuhara T., Sukanuma M. and Fujiki H. 2008. Green tea catechin as a chemical chaperone in cancer prevention. *Cancer Letters*. 261: 12-20.
- [21] Tsai T.H., *et al.* 2008. In vitro antimicrobial activities against cariogenic streptococci and their antioxidant capacities: A comparative study of green tea versus different herbs. *Food Chemistry*. 110: 859-864.
- [22] Lu C.H. and Hwang L.S. 2008. Polyphenol contents of Pu-Erh teas and their abilities to inhibit cholesterol biosynthesis in Hep G2 cell line. *Food Chemistry*. 111: 67-71.
- [23] Trompezinski S., Denis A., Schmitt D., Viac J. 2003. Comparative effects of polyphenols from green tea (EGCG) and soybean (genistein) on VEGF and IL-8 release from normal human keratinocytes stimulated with the proinflammatory cytokine TNF alpha. *Arch. Dermatol. Res*. 295: 112-116.
- [24] Tedeschi E., Suzuki H., Menegazzi M. 2002. Antiinflammatory action of EGCG, the main component of green tea, through STAT-1 inhibition, *Ann. N. Y. Acad. Sci.* 973, 435-437.
- [25] S. J. Temple, S. T. Tambala, A. J. B. van Boxtel. 2000. Monitoring and control of fluid-bed drying of tea. *Control Engineering Practice*. 8: 165-173.
- [26] Partha Pratim Dutta, Debendra Chandra Baruah. 2014. Drying modelling and experimentation of Assam black tea (*Camellia sinensis*) with producer gas as a fuel. *Applied Thermal Engineering*. 63: 495-502.
- [27] E.W.C. Chan, Y.Y. Lim, S.K. Wong, K.K. Lim, S.P. Tan, F.S. Lianto, M.Y. Yong. 2009. Effects of different drying methods on the antioxidant properties of leaves and tea of ginger species. *Food Chemistry*. 113: 166-172.
- [28] Wan-Joo Kim, Jae-Duck Kim, Jaehoon Kim, Seong-Geun Oh, Youn-Woo Lee. 2008. Selective caffeine removal from green tea using supercritical carbon dioxide extraction. *Journal of Food Engineering*. 89: 303-309.



- [29] Jun Xi, Yujing Xue, Yinxiang Xu, Yuhong Shen. 2013. Artificial neural network modeling and optimization of ultrahigh pressure extraction of green tea polyphenols. *Food Chemistry*. 141: 320-326.
- [30] Amra Perva-Uzunalic, Mojca S kerget, Z' eljko Knez, Bernd Weinreich, Frank Otto, Sabine Gru"ner. 2006. Extraction of active ingredients from green tea (*Camellia sinensis*): Extraction efficiency of major catechins and caffeine. *Food Chemistry*. 96: 597-605.
- [31] Shiromani Jayasekera, Lovedeep Kaur, Abdul-Lateef Molan, Manohar L. Garg, Paul J. Moughan. 2014. Effects of season and plantation on phenolic content of unfermented and fermented Sri Lankan tea. *Food Chemistry*. 152: 546-551.
- [32] Amra Perva-Uzunalic, Mojca S' kerget, Z' eljko Knez, Bernd Weinreich, Frank Otto, Sabine Gru"ner. 2006. Extraction of active ingredients from green tea (*Camellia sinensis*): Extraction efficiency of major catechins and caffeine, *Food Chemistry*. 96: 597-605.

[Site Map](#)



Welcome to ARPJ Journal of Engineering and Applied Sciences

[Home](#)

[Archive](#)

[Submit Paper](#)

[Author Guidelines](#)

[Editorial Board](#)

[Publication Fee](#)

[Status of upcoming papers](#)

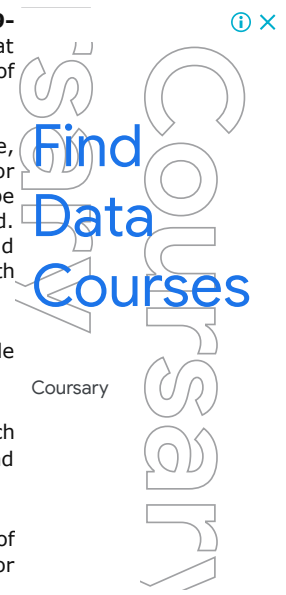
ARPJ Journal of Engineering and Applied Sciences (ISSN 1819-6608) is an online peer-reviewed International research journal aiming at promoting and publishing original high quality research in all disciplines of engineering sciences and technology.

All research articles submitted to ARPJ-JEAS should be original in nature, never previously published in any journal or presented in a conference or undergoing such process across the globe. All the submissions will be peer-reviewed by the panel of experts associated with particular field. Submitted papers should meet the internationally accepted criteria and manuscripts should follow the style of the journal for the purpose of both reviewing and editing. Our mission is

- In cooperation with our business partners, lower the world-wide cost of research publishing operations.
- Provide an infrastructure that enriches the capacity for research facilitation and communication, among researchers, college and university teachers, students and other related stakeholders.
- Reshape the means for dissemination and management of information and knowledge in ways that enhance opportunities for research and learning and improve access to scholarly resources.
- Expand access to research publishing to the public.
- Ensure high-quality, effective and efficient production and support good research and development activities that meet or exceed the expectations of research community.

Scope of Journal of Engineering and Applied Sciences

- Engineering Mechanics
- Surveying
- Modeling & Simulations
- Manufacturing Technologies
- Metallurgy
- Electronic Communication Systems
- Mining & Minerals
- Applied Sciences
- Chemical Engineering
- Tube Wells & Pumps
- Construction Materials
- Fluid Mechanics & Hydraulics
- Thermodynamics
- Refrigeration & Air-conditioning
- Automatic Control Systems
- Agricultural Machinery & Equipment
- Mechatronics
- Public Health Engineering
- Hydrology
- Structures



ANNOUNCEMENT
Call For
Research Papers
online publishing





2020 Journal Impact Factors

Chemistry of Materials

Find out where the most important chemistry research is being published.

axial.acs.org

OPEN

ARNP Journal of Engineering and Applied Sciences

COUNTRY

SUBJECT AREA AND CATEGORY

PUBLISHER

H-INDEX

Pakistan



Universities and research institutions in Pakistan

Engineering
Engineering (miscellaneous)

32

PUBLICATION TYPE

ISSN

COVERAGE

Journals

18196608

2009, 2011-2020

SCOPE

Information not localized

Join the conversation about this journal

Ads by Google

Stop seeing this ad

Why this ad?

2020 Journal Impact Factors

Chemistry Journal CiteScore

See the 2020 journal citation metrics from all your favorite chemistry journals.

axial.acs.org

OPEN

Quartiles

2020 Journal Impact Factors

Chemistry Journal CiteScore

See the 2020 journal citation metrics from all your favorite chemistry journals.

axial.acs.org

OPEN

2020 Journal Impact Factors

ACS Nano | ACS journal metrics

See the 2020 journal citation metrics from all your favorite chemistry journals.

axial.acs.org

OPEN

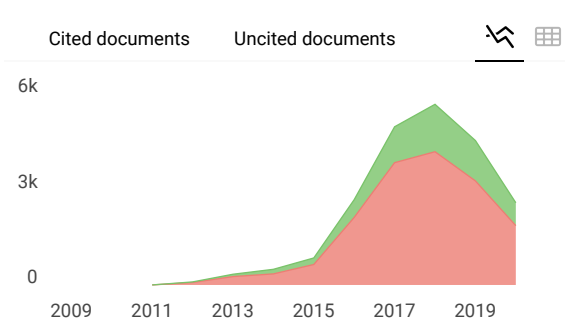
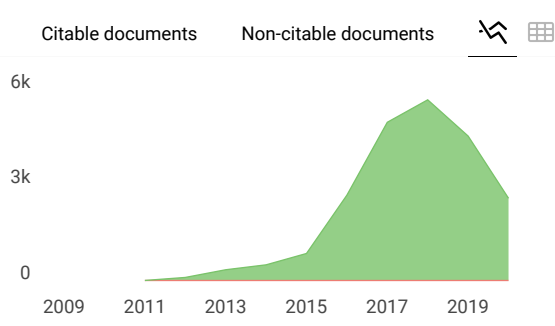
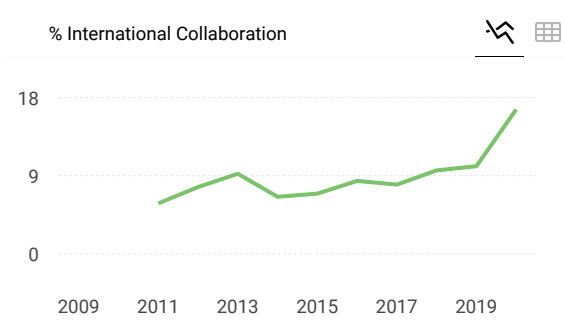
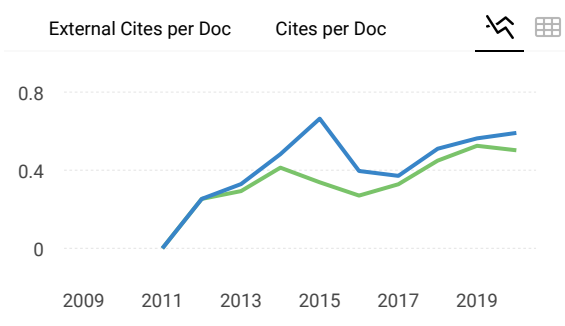
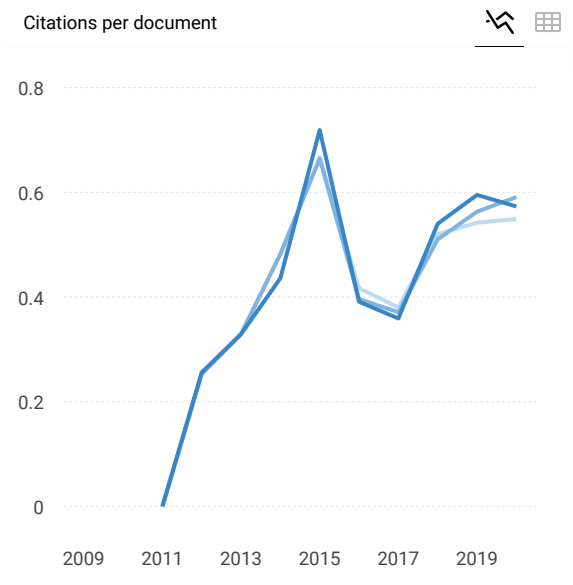
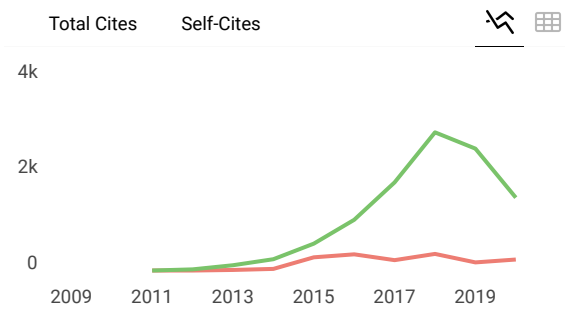
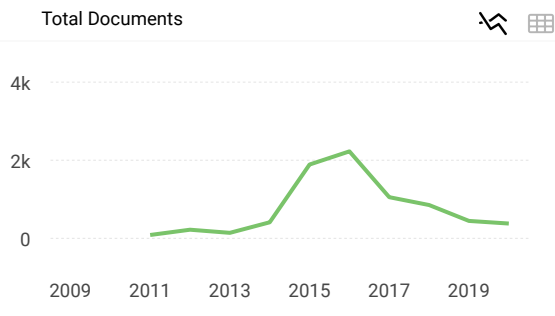
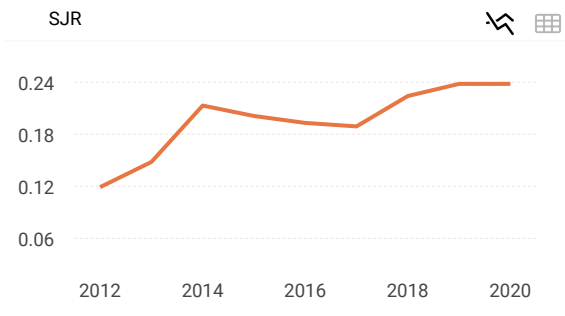
FIND SIMILAR JOURNALS ?

| | | | |
|--|---|---|--|
| 1 International Journal of Engineering and ARE | 2 Journal of Engineering Science and Technology MYS | 3 International Journal of Engineering Research and IND | 4 Journal of Telecommuni MYS |
| 31% | 30% | 30% | 2 |

Ads by Google

Stop seeing this ad

Why this ad? ⓘ



ARNP Journal of Engineering and Applied Sciences

Q3 Engineering (miscellaneous) best quartile

SJR 2020 0.24

powered by scimagojr.com

← Show this widget in your own website

Just copy the code below and paste within your html code:

```
<a href="https://www.scimaç
```



Ads by Google

Stop seeing this ad Why this ad? ⓘ



ARPN Journal of Engineering and Applied Sciences

[Home](#)[Archive](#)[Submit Paper](#)[Author Guidelines](#)[Editorial Board](#)[Publication Fee](#)**Editorial Board****Editor-in-Chief:** Engr. J. K. Tarakzai (PAKISTAN)

| # | Editors | Country |
|--------------------------|--|----------------|
| 1 | Prof. Dr. R. J. Godwin | UNITED KINGDOM |
| 2 | Prof. Dr. Erik Valdemar Cuevas Jimenez | GERMANY |
| 3 | Prof. Dr. Hamou SADAT | FRANCE |
| 4 | Dr. Mohammad Aminul Islam | JAPAN |
| 5 | Prof. Dr. Kui Fu Chen | CHINA |
| 6 | Prof. Dr. M. Ashraf Chaudhry | NEW ZEALAND |
| 7 | Prof. Dr. A. Sermet Anagun | TURKEY |
| 8 | Prof. Dr. Ashraf Mohamed Hemeida | Saudi Arabia |
| 9 | Prof. Dr. Krishna Murari Pandey | INDIA |
| 10 | Prof. Dr. Magdy A. Ezzat | EGYPT |
| 11 | Prof. Dr. Roberto Brighenti | ITALY |
| 12 | Dr. Anurag Misra | INDIA |
| 13 | Prof. Dr. Adel M. ALIMI | TUNISIA |
| 14 | Prof. Dr. Arun Kumar Gupta | INDIA |
| 15 | Prof. Demetrios V. Bandekas | GREECE |
| 16 | Prof. Dr. Bensafi Abd-El-Hamid | ALGERIA |
| 17 | Dr. Rajanish K. Kamat | INDIA |
| 18 | Prof. Dr. Asma Thamir Ibraheem | IRAQ |
| 19 | Prof. Dr. Sylejman Hyseni | KOSOVO |
| 20 | Prof. Dr. Haider Zaman | Saudi Arabia |
| 21 | Prof. Dr. Debojyoti Mitra | INDIA |
| 22 | Prof. Dr. Pandian VASANT | MALAYSIA |
| 23 | Prof. Dr. Prakash MMS Kinthada | INDIA |
| Associate Editors | | |
| 1 | Dr. Dongning Li | USA |
| 2 | Dr. Suheyra Yerel | TURKEY |
| 3 | Dr. Guoxiang Liu | USA |
| 4 | Dr. Nadeem Anjum | PAKISTAN |
| 5 | Engr. Malini Sarah Philip | NORWAY |
| 6 | Dr. K.V.L.N. Acharyulu | INDIA |
| 7 | Engr. Mohammad Khalily Dermany | IRAN |
| 8 | Dr. Lamyaa- Gamal Eldeen Taha | EGYPT |
| 9 | Dr. OM Prakash Singh | INDIA |
| 10 | Engr. Seyyed Mohammad Reza Farshchi | IRAN |
| 11 | Dr. Muhammad Imran Din | PAKISTAN |
| 12 | Dr. José Carlos Páscoa Marques | PORTUGAL |
| 13 | Engr. Fawwaz Jinan Jibrael Jabri | IRAQ |
| 14 | Dr. Kanad Ray | INDIA |

| | | |
|----|-----------------------|----------|
| 15 | Dr. Shamsuddin Shahid | MALAYSIA |
| 16 | Engr. Naveenji Arun | INDIA |

arpnjournals.com
of Ethics

[Publishing Policy](#)

[Review Process](#)

[Code](#)



Google Custom Search

[Home](#)[Archive](#)[Submit Paper](#)[Author Guidelines](#)[Editorial Board](#)[Publication Fee](#)**Title:** Towards computer-generated Mnemonic phrases: Experiments with genetic algorithms and n-grams**Author (s):** James Mountstephens

Abstract: Mnemonic phrases have the potential to help people commit information to memory and may be a valuable aid to education. However, their widespread application is currently limited by the effort and creativity required to generate them manually. This paper describes a method for the automatic generation of effective mnemonics by computer, framing the task as an optimisation problem to be solved by Genetic Algorithms using parser output and n-gram frequencies to evaluate fitness. Grammatical constraints and lexical familiarity are parameters tested for their ability to produce more memorable sentences. The method has been implemented using custom code and existing libraries, and tested, showing promising results on list data of increasing difficulty.

[Full Text](#)**Title:** Experimental study of biomass stove portable with and without fin which briquettes fuel from corncob**Author (s):** Syamsuri and Suheni

Abstract: The increase in energy demand caused by population growth and resource depletion of oil reserves as well as the problems of emissions from fossil fuels put pressure on every country, especially Indonesia. Briquettes of corncob were one of the alternatives. In addition replaced the firewood, they also did not potentially damage the ecology of the forest and could replace fossil fuel reserves that were running low. Water boiling test was used to determine the performance of a portable stove with and without fin. Inside the stove there were 3 pots: pot 1 contained egg, pot 2 contained of rice, and pot 3 was vegetables. This study was obtained for the power of furnace for different diameter of briquette 3/4 ", 1" and 1.5" without fins was equal to 0.87 kW, 1.12 kW and 1.57 kW, respectively. Efficiency 17.58%, 19.7%, and 23.15%. While the furnace with diameter briquette 3/4 ", 1" and 1.5" using fins obtained the power 0.98 kW, 1.32 kW and 1.96 KW. Efficiency 14.84%, 20.91% and 25.27%. The fastest cooking time was gained for the finned pan with diameter of briquettes 1.5" over 20 minutes.

[Full Text](#)**Title:** Measuring the net benefit of an e-commerce for a university: A case study of the university of Surabaya's e-commerce**Author (s):** Jimmy

Abstract: E-commerce is the use of telecommunication network, the internet in particular, to conduct business activities such as purchasing, sales of goods and services, after sales services and many other kinds of business processes. Although e-commerce could deliver dramatic positive impacts for an organization, an e-commerce implementation require a considerable amount of investment and the result of that large investment is hard to measure. The objective of this study is to measure the net benefit of an e-commerce for a university using a case study of the University of Surabaya's e-commerce. To measure the net benefits, this paper will use the updated Delone and McLean Information System Success Model due to the popularity of their model among I.S. researchers. Although, this study is unable to quantify the net benefits in term of money of an e-commerce implementation, this study reveals how an e-commerce can be used by a university to generate various significant positive impacts towards its customers, to its staffs, to the organization itself and also to the environment.

[Full Text](#)**Title:** Application of improved multistage vehicle routing problem with time window**Author (s):** Dian Retno Sari Dewi, Dini Endah Setyo Rahaju and Lisa Anjani

Abstract: This paper presented an application of improved multistage vehicle routing problem with time window. By using this improved method, we can solve a multistage vehicle routing problem issue. We applied this model for two layers multistage. First layer consist of only one depot which distribute items among the distributors, second layer consist of several distributors which distribute items among several retailers. Adaptation to Larsen model was for second layer, which consist of several distributors which distribute to several retailers. Meanwhile Larsen model only worked on one depot which distribute among several distributors. In this model, we worked on two steps. First step is to solve second layer problems. We must determine the delivery area of retailers among the distributors by combine all possible path to minimize distance within capacity vehicle constraint and time window constraint. Next step was to solve first layer problem. We worked with Larsen model for solving the first layer. Using this improved multistage vehicle routing problem with time window helped to solve multistage vehicle routing problem as well as minimize distance.

[Full Text](#)

Title: A study on ERP assimilation and benefit realisation based on diffusion of innovation theory

Author (s): Rajesri Govindaraju and Rizka Aisha Rahmi Hariadi

Abstract: Along with the development of information technology, lots of companies implement Enterprise Resource Planning (ERP) systems because ERP systems promise a lot of benefits. Although many companies have successfully implemented ERP systems, not all companies get the benefits of ERP system since ERP systems have not been able to diffuse in the routine of organization. This study examined the influence of organisational factor on enterprise resource planning (ERP) benefits realisation through ERP assimilation process. A conceptual model was developed based on the diffusion of innovation (DOI) theory. The developed model was tested using empirical data gathered from a questionnaire survey. Data processing was done using structural equation modeling (SEM) with the support of Lisrell 8.7 statistical software. The result of hypotheses testing shows that ERP assimilation significantly influences overall ERP benefit. Further, this study found that outcome orientation and communication process influence ERP assimilation process significantly.

[Full Text](#)

Title: Determination of emission factors for soil borne dustfall and suspended particulate in ambient air

Author (s): Arief Sabdo Yuwono, Lia Amaliah, Nur Riana Rochimawati, Allen Kurniawan and Budi Mulyanto

Abstract: Two important factors contributing air quality deterioration, i.e. dustfall and suspended particulate, are obligatory parameters necessary to describe air quality. The research objectives were to measure the generated dustfall and suspended particulate in ambient air over a model area constructed of Oxisol as well as Ultisol soil and to determine the emission factors of dustfall and suspended particulate generation as affected by wind speed and soil moisture content over an area covered by both soil classes. The measurement of dustfall and suspended particulate was conducted in a laboratory scale tunnel where the land surface was covered by Oxisol and subsequently changed by Ultisol soil. The instruments used during the experiments were dustfall canister, blower, anemometer, moisture tester, tunnel, analytical balance, Petri dish, filter paper 10 μ and universal oven. Result of the measurements showed that the average generated dustfall from Oxisol and Ultisol soil surface were 9 and 15 ton/km²-month, respectively. The generated suspended particulate from Oxisol covered area was 150 μ g/Nm³ and for Ultisol area was 102 μ g/Nm³. The developed emission factor equations as affected by wind speed and soil moisture content are at this point ready for field implementation to predict the dustfall and suspended particulate generation over land covered by both soil types.

[Full Text](#)

Title: Characteristic of vortex in a mixing layer formed at nozzle PitzDaily using OpenFOAM

Author (s): Suheni and Syamsuri

Abstract: PitzDaily nozzle was the most substantial component in a gas turbine. This nozzle was used to mix air with propane. In the application value of turbulence and vortex center was very important for this type of nozzle. Reynolds number was a parameter used to see its effect on the value of turbulence and vortex center. The method applied was a numerical simulation by using OpenFOAM. This simulation was performed to determine the distribution of pressure, streamline, turbulence, and vortex center. The study was conducted by varying Reynolds numbers 12210, 50000, and 100000. Grid independent test was made to validate with the results of previous research. By this simulation results indicated that this method was feasible and the solver was highly accurate. The results showed that the higher the value of Reynolds number, the further away of vortex center rear nozzle. The mark of turbulence and vortex length were also increased. In addition to that the larger the value of this then the mixture of air and propane formed a fine grained, so it became more perfect combustion.

[Full Text](#)

Title: Expertise-based experts importance weights in adverse judgment

Author (s): Evy Herowati, Udisubakti Ciptomulyono, Joniarto Parung and Suparno

Abstract: The objective of this research was to propose the use of expertise levels of experts to determine the experts' importance weights since there has been no research that determines the 'importance weight' using the expertise level as a whole. The significance of this research was the integration of three concepts, namely: the *expert's expertise level*, FPR's *Additive Consistency* and the *Induced-OWA operator* to obtain the expert's importance weight in adverse judgment situation. The Expertise level of an expert in adverse judgment situation is determined by his/her own assessment on a set of alternatives and defined as 'the ability to differentiate consistently' and expressed as the ratio between Discrimination and Inconsistency. The experts provided their preferences using FPR (Fuzzy Preference Relations) since FPR has Additive Consistency property to replicate each element of FPR matrix. Experts were sorted according to their expertise level and the experts' importance weights followed the OWA (Ordered Weighted Averaging) operator's weights which were determined by parameterization using Basic Unit-Interval Increasing Monotonic functions. The experts' importance weights model illustrated by a numerical example, and it concluded that the higher the expert's expertise level, the higher his/her importance weight.

[Full Text](#)

Title: Analysis of temperature dependence on solar energy radiation pattern at different wavelengths

Author (s): M. A. Humayun, M. A. Rashid, F. Malek and Syafruddin Hasan

Abstract: This paper presents a theoretical analysis of the effect of atmospheric temperature and the light emission wavelength from the Sun on the solar energy radiation pattern. In this study, we have investigated extensively the radiant emittance phenomena of the solar radiation by using Planck's law of radiation and the Stephan-Boltzmann's law. Wavelength dependence of radiant emittance has been analyzed at three different temperatures. We have considered the three different temperatures such as room temperature i.e. 300K, 275K as temperature below room temperature and 325K as the temperature above room temperature. The three different temperatures considered in this present analysis are chosen very close to each other to investigate exactly the effect of wavelength on the radiation pattern of the emitted energy from the Sun due to the small change in temperature. Further the effect of temperature on radiant emittance has also been investigated at three different

wavelengths. The three wave lengths considered in our research work are 1.55 μm , 1.3 μm and 0.89 μm respectively. The range of wavelength has been considered within the limit of 0.89 μm - 1.55 μm because this range of wavelength corresponds to the energy bandgap of the semiconductor materials from 0.8 eV to 1.4 eV, which are widely used for solar cell fabrication. The investigation of the temperature dependence with maximum wavelength of the radiated energy was carried out up to the black body temperature. Numerical results obtained have been analyzed. It is revealed from the numerical analysis that not only the atmospheric temperature but also the wavelength of the emitted light from the Sun affects the radiation pattern significantly.

[Full Text](#)

Title: A comparative study of conceptual graph and concept map

Author (s): Ruziana Binti Mohamad Rasli, Faudziah Ahmad and Siti Sakira Kamaruddin

Abstract: The purpose of this paper is to compare two types of graphical models that are widely being used nowadays. The models are called conceptual graph and concept map. Although the names of these models are similar, however, the characteristics of each model are different. A number of 18 papers are compared and important elements for these models are discussed in these papers. This paper is divided into eight sub-topics. The output of this paper is the comparison of characteristics and usage of these two graphical models. In the last part of this paper, a conclusion of the models is made to give better view of it.

[Full Text](#)

Title: The effect of zinc dialkyldithiophosphate addition to corn oil in suppression of oxidation as enhancement for bio lubricants: A review

Author (s): Muhamad Azwar Azhari, Quratul Nadia Suffian and Nur Rashid Mat Nuri

Abstract: The needs of having a substitute for petroleum based lubricant are being studied by researchers since the last decades. Vegetable oil which is known to be biodegradable, renewable and have the similar properties of lubrication as petroleum based oil is seen to be a candidate for the substitution. However, the high content of unsaturated fatty acids in vegetable oils causes the oil to be less cooperative in stabilizing oxidation. The purpose of this paper is to discuss the effect of zinc dialkyldithiophosphate (ZDDP) addition as antioxidation agent in commercialized corn oil process as a barrier to commercialized corn oil. The introduction of ZDDP into the corn oil could resolve the oxidation problem since ZDDP is an effective antioxidant. The capability of ZDDP exhibits both primary and secondary antioxidant is desirable in biolubricant oil in order to suppress the oxidation process.

[Full Text](#)

Title: Methods of tumor detection using microwave technology: A review

Author (s): Myzatul Diana Daud, Mohd Azlilah Othman, Mohd Fairuz Iskandar Othman

Abstract: The present study, which is a part of a series of comparative studies, aims to find out the type of techniques for tumor detection. The tumor detection usually used is mammography, where is it being quite sensitive to the lesions in the breast by compressing the breast on X-ray image. But it still due to exposure to ionizing radiation with the way of diagnoses method by breast compression and furthermore mammography is not sensitivity for early-stage tumor detection but only for the best and effective medical treatment. So the engineers and scientists are motivated to make improvement in alternative or complementary technologies for breast imaging techniques which technique is can promise the procedure is safe, simple to perform, reasonable cost, existing convenience, sensitive to the tumors and methods of screening for breast cancer has been established namely, ultrasound, mammography and magnetic resonance imaging (MRI). More important is comfortable to patients. The result of analysis from the engineers and scientists found and propose microwave imaging is the best method for breast cancer detection and they had proven their experiment. In addition, their upgrade this method to become more sensitive which is can detect early-stage breast cancer namely microwave imaging via space-time (MIST) beam forming. To optimize measurement moderate endogenous dielectric contrast between normal and malignant tissues and increase the spatial resolution at microwave frequencies is more challenging.

[Full Text](#)

Title: Mobile learning application based on augmented reality for science subject: iSains

Author (s): Nazatul Aini Abd Majid and Nooraidah Kamarudin Husain

Abstract: The use of technology in education is no longer foreign. Various forms of technologies have been applied in order to attract and increase students' attention in the learning process. Therefore, the development of an application based on science education which includes Augmented Reality technology and Thinking Map concept are considered desirable. The development of this application is mainly due to the identification of several shortcomings by the lack of students' involvement during the teaching and learning process, less mobile aid learning approach, and lack of existing mobile application for science subject for primary schools. The main objective of this research is to design and develop a new mobile application that can be an additional tool in learning science. This application called iSains was developed based on Rapid Application Development methodology for two topics which are the day and night, and moon phases. This research has contributed to the development of mobile application of science subject for primary school in Malaysia by integrating a new emerging technology in education which is Augmented Reality that allows students to view 3D model of moon phases through their text book. Thinking map concept has also been implemented in the application in order to improve the organization of the learning content. This mobile application is expected to assist primary students in Malaysia to learn about the day and night, and moon phases, effectively.

[Full Text](#)

Title: Ontology-based knowledge acquisition for Thai ingredient substitution

Author (s): Pimsupa Saengsupawat, Thara Angskun and Jitimon Angskun

Abstract: Cooking is an important activity because food is one of the basic necessities of life. However, some ingredients are difficult to find in some seasons or some regions, therefore ingredient substitution is

needed for real taste. This article presents a knowledge acquisition model for ingredient substitution by applying Thai cuisine recipe for a case study. The main purpose of this research is to substitute rare Thai ingredients using existing ingredients. The proposed model is applying the concept of domain ontology to design the entities and relations among these entities which are related to ingredient substitution in Thai cuisine recipe. In addition, a set of rule bases by Semantic Web Rule Language (SWRL) is designed and embedded into the ontology to apply for discovering the existing ingredients that can substitute the rare Thai ingredients.

[Full Text](#)

Title: Self-organization feature map based on VQ components to solve image coding problem

Author (s): Sahdi M. S. Hilles and Maidanuk V.P.

Abstract: This paper present image coding which is gained many researchers attention in order to improve the quality of image after the compression process. Since this is expended most computing resources and research which is related not only to search for a mathematical transformation, but also to study the characteristics of visual perception of the image features and fail-safe transmission of images via communication channels. There are many methods of image coding with neural networks of 2D SOFM kohonen map have been suggested and investigated. The coding schemes are proposed methods vector quantization as the original image, and the spatial frequency image component derived from the adaptive to the contours of the two-dimensional analysis and synthesis. The calculation of the computational cost in compression based on Kohonen maps. The methods are characterized by a high level of adaptation due to the introduction of educational stage that provides for the increase of multiplication ratio and high quality of image restarting after coding. The modified method of image multiplexing based on characteristic feature of the given method is vector digitizing of image components. This paper considers the coding problem of photo realistic images, presented in a digital form. The characteristic feature of the method is the application of pair exchange, this increases processing speed and sorting of data arrays. However the result of proposed method is shown the image quality after compression processor. Using this approach the differences or lost pixels between the image after and before compression processor are considered. The propose method may useful for image representation and image coding researcher and such related field.

[Full Text](#)

Title: Modified Direct-ZBR method PSO power flow development for weakly meshed active unbalanced distribution systems

Author (s): Suyanto, Indri Suryawati, Ontoseno Penangsang, Adi Soeprijanto, Rony Seto Wibowo and DF Uman Putra

Abstract: Electrical distribution system is a part of electrical system that is directly connected to the customers. Reliability and power quality of electrical distribution system must be maintained so that they can use electricity continuously. Many methods can be done to improve them of electrical distribution system, such as penetration of Distributed Generations (DG's) and weakly meshed distribution network reconfiguration. These methods will change a passive distribution network to an active one with weakly meshed configuration. Due to the special characteristics of distribution systems, this paper introduces a three phase power flow method that can handle passive/active and radial/weakly meshed distribution networks. The Modified direct-Z_{BR} method is developed in this proposed method and combined with Particle Swarm Optimization (PSO). The proposed method is applied to 20 kV distribution network in Surabaya city, East Jawa, Indonesia. Three simulation cases are studied for the test system. The computational speed of three simulation cases shows the number of iterations for these cases are increased but the apparent losses decrease. It means that the proposed method is robust and suitable for weakly meshed reconfiguration. The results show that the proposed power flow method can handle the active unbalanced distribution system with weakly meshed configuration.

[Full Text](#)

Title: An energy efficiency mobile clustering system for wireless sensor networks

Author (s): M. Zen Samsono Hadi, Aries Pratiarso and Hideyuki Uehara

Abstract: In recent years, research on wireless sensor networks has increased significantly because it offers the advantage of monitoring a wide variety of environments to detect physical phenomena. Wireless sensor networks consist of many sensor nodes where each sensor node has ability to send, receive and detect phenomena. On the other hand, sensor nodes have limited capabilities such as memory capacity, bandwidth and energy consumption. In this research, we focus on energy consumption in supporting clustering protocol and evaluate it in mobile networks. We use the reference of protocol i.e. LEACH to evaluate our protocol i.e. MN-LEACH. The proposed protocol add feature of LEACH to support mobile nodes as well as to get energy efficiency in each round of the network resource. The performance of MN-LEACH outperforms LEACH because it supports hand-off mechanism.

[Full Text](#)

Title: Sustainable long-term electricity supply-demand: Bottom-up models review and overview of the proposed framework

Author (s): Yusak Tanoto and Ekadewi A. Handoyo

Abstract: Long-term electricity supply-demand can be generally represented into bottom-up models in order to perform optimization with regard to available energy resources and demanded power. The main objective of such models is usually to minimize energy system cost as well as sectoral cost. The aim of this paper is to present a brief review of the commonly used bottom-up energy models and the overview of the proposed framework which describes a sustainable long-term electricity supply-demand. The framework is mainly developed using Long-range Energy Alternatives Planning System (LEAP). In the proposed framework, Demand Side Management is considered as one of system's scenario in the demand side whereas utilization of locally available renewable energy resources is taken into account in the supply side.

[Full Text](#)

Title: Application of hot air tray drying in small scale traditional home roof tiles manufacture cluster in Ngunut Sub-district East Java Indonesia

Author Puguh Setyoprato

(s):

Abstract: Home roof tiles cluster located in Ngunut Sub-district, East Java Indonesia has been developed since 1970. In such traditional tiles manufacturing business sun drying is still used and the main problem is the long drying time and its dependency on the season. This work intends to solve the main problem by implementing hot air tray drying instead of the sun drying. Hot air drying at air temperature range 50 - 90 °C and air velocity ranging from 0.4 m/s to -0.6 m/s resulted in moisture diffusivity within wet tile range 2.46×10^{-4} - 4.20×10^{-4} m²/s and drying rate range 25 - 35 gr H₂O/(m².mnt). Application of hot air tray drying instead of sun drying result in reduction of total drying time from 5 days to one day, then production capacity significantly increases. Furthermore, another major advantage of the application of hot air tray drying is its independency on the seasons, since hot air drying will running well in both dry and rainy season.

[Full Text](#)

Title: Fourier series semiparametric regression models (case study: the production of lowland rice irrigation in Central Java)

Author (s): Luh Juni Asrini and I Nyoman Budiantara

Abstract: Semiparametric regression model is a regression model where the shape of regression curve consists of a known pattern of parametric components and a smooth (smooth, flawless, slippery) nonparametric component which the pattern is unknown. The approach that used in estimating the nonparametric regression curves, one of which is, the Fourier series estimator. Fourier series estimator is commonly used when a data investigated patterns are not known and there is a tendency of repeating patterns. In the Fourier series estimator, the shape of nonparametric regression curve is assumed unknown and is contained in the space of continuous functions $C(0, n)$. This study aimed to analyze the shape of the estimator of the Fourier series semiparametric regression curve and applying it's to the data production of lowland rice irrigation in Central Java. Case studies are used to model the production of lowland rice irrigation in Central Java with predictor variables harvest area, the use of fertilizers, pesticides, seed, and the use of labor. Modeling aimed to determine the magnitude influence of the predictor variables on the response variable that is the number of production of lowland rice irrigation in Central Java. Modeling the production of lowland rice irrigation in Central Java with Fourier series semiparametric regression produced the coefficient value of determination $R^2 = 0.92$. It means that the magnitude influence of the predictor variables on the response variable is 92%. The performance of Fourier series semiparametric regression model was quite good in modeling the production of lowland rice irrigation in Central Java.

[Full Text](#)

Title: Study the use of additional materials to improve quality concrete using the sand with high levels sludge

Author (s): Dewi Pertiwi, Eka Susanti and Theresia Maria C.A.

Abstract: With the increasing use of concrete in the construction industry, the more the effort to make it. According to ISO, the sand used for the concrete mix should not contain levels of sludge, which is more than 5%. In reality, however, the field-level implementation sludge contained in the sand for the concrete mix is often overlooked, because to achieve a level of mud that is less than 5% sand, must be washed first. For washing the sand in large quantities will require plenty of water and quite a long time. Previous researchers conducted a study on the effect of aggregate mud content; the quality of the concrete, the results obtained from these studies that the mud content of 7% to 20% decreased the compressive strength of concrete is not too significant to normal, with the percentage decrease of 0.432%, 0.996 %, 2.847%, 4.858%. Based on the findings above, this time researchers will conduct experiments with the manufacture of concrete mixtures in the laboratory using additional materials such as cement and fly ash with a percentage based on the excess mud contained levels on a sand. The test specimen used in the form of the cylinder size 150mm x 300mm, used sand containing mud content of 18% and 20%, in which the experiment makes 5 Variations specimen, variation 1 by adding 13% of cement by weight of cement to the sand with 18% mud content, variation 2 by adding 15% cement, 20% for mud levels. Variation 3 adds the fly Ash 13%, while variation 4 adding 15% fly ash. For variety of 5, use sand containing mud with content of 3.6% as a comparison for Normal Concrete. The result showed an average compressive strength of concrete for variation 1 is 22,45Mpa the medium compressive strength of concrete for variation 2 is equal to 21.90 MPa. Then the mean compressive strength of concrete of variation of 3 is equal to 25.14 MPa. Next the mean compressive strength of concrete is equal to 28.20 MPa for variation 4. Finally, the compressive strength of concrete for variation of 5 is equal to 21.94 MPa. Thus variation 1 has increased the compressive strength of concrete by 2.32%. Variation 2 decreased by 0.18%. Variation 3 an increase of 14.58%. Variation 4 an increase of 28.53% against the normal concrete (Variation 5).

[Full Text](#)

Title: Optimal design of wind turbine blades equipped with flaps

Author (s): I. Kade Wiratama and Alireza Maheri

Abstract: As a result of the significant growth of wind turbines in size, blade load control has become the main challenge for large wind turbines. Many advanced techniques have been investigated aiming at developing control devices to ease blade loading. Amongst them, trailing edge flaps have been proven as effective devices for load alleviation. The present study aims at investigating the potential benefits of flaps in enhancing the energy capture capabilities rather than blade load alleviation. A software tool is especially developed for the aerodynamic simulation of wind turbines utilising blades equipped with flaps. As part of the aerodynamic simulation of these wind turbines, the control system must be also simulated. The simulation of the control system is carried out via solving an optimisation problem which gives the best value for the controlling parameter at each wind turbine run condition. Developing a genetic algorithm optimisation tool which is especially designed for wind turbine blades and integrating it with the aerodynamic performance evaluator, a design optimisation tool for blades equipped with flaps is constructed. The design optimisation tool is employed to carry out design case studies. The results of design case studies on wind turbine AWT-27 (Aerodynamic Wind Turbine-27) reveal that, as expected, the location of flap is a key parameter influencing the amount of improvement in the power extraction. The best location for placing a flap is at about 70% of the blade span from the root of the blade. The size of the flap has also significant effect on the amount of enhancement in the average power. This effect, however, reduces dramatically as the size increases. For constant speed rotors, adding flaps without re-designing the topology of the blade can improve the power extraction capability as high as of about 5%. However, with re-designing the blade pretwist the overall improvement can be reached as high as 12%.

[Full Text](#)

Title: Extraction of phenolic compounds from green tea using ethanol

Author (s): Puguh Setyoprato

Abstract: Ethanol was used as a solvent to extract phenolic compounds from dried fresh tea leaves (*Camellia sinensis* L. Kuntze). The extraction was performed at temperature of 40, 50, and 60 °C which was maintained using a water bath. Folin-Ciocalteu's reagent was used to determine the total phenolic content spectrophotometrically and gallic acid was used as the calibrant. The highest yield, which was 0.3347 g extract/g dry tea leaves, was obtained at extraction temperature 60 °C and extraction time 240 minutes. While the lowest yield, which was 0.2807 g extract/g dry tea, leaves, was obtained at temperature 40 °C and 15 minutes extraction time. The value of total phenolic content obtained in this work is between 0.21 - 0.25 mg GAE/mg extract. The study also demonstrated that the extraction of tea leaves with ethanol at relatively low temperature exhibit considerable efficient method to obtain extract with relatively high total phenolic content.

[Full Text](#)

Title: Bayesian approach on parameter estimation in hidden Markov model

Author (s): Dwi Agustin N.S, Septiadi Padmadisastra and Sudartianto

Abstract: This paper presents study about the parameter estimation in hidden markov model. The approach is taken from a Bayesian method, there will be two sources of information, there are information from the likelihood function and the prior function. This approach will be applied to daily rainfall data in Darajat, Garut. The numbers of hidden states are used in this paper based on Schmidh and Fergusson's climate classification which are suitable to the local conditions. This classification was obtained three types of division in the period of one year where the condition called wet months when monthly rainfall > 100 mm per month, moist months when monthly rainfall between 100 - 60 mm and the dry months when monthly rainfall <60 mm per month. The process estimation of hidden markov parameters is using Gibbs Sampler algorithm.

[Full Text](#)

Title: Development of a modular system for drilling aid for the installation of dental implants

Author (s): Eugenio Pezzuti, Pier Paolo Valentini, Luca Piancastelli and Leonardo Frizziero

Abstract: In oral implantology, proper execution of the holes for the installation of dental implants is directly related to the correct functioning and durability of the system itself. For this reason, the procedure discussed here, which was once performed freehand in all its phases, is now being implemented through aids with more precision. Masks currently in use are created in resin ad hoc; surgical stents are inserted into the holes that will then be used as a guide. These aids are fixed into the jaw by means of micro bone screws in order to prevent movement during surgery. Despite this, we still use the guides as they are, centered properly with the help of drilling jigs. The same technique is also used in partially edentulous cases through smaller jig fixed on teeth near to the implant zone. In this article, we propose a guidance system for milling cutters used in partially edentulous cases involving from one to three adjacent installations. The purpose of the study was to realize a modular model adaptable to most dental implants, as well as efficient, quick, and low cost by pouring the resin into a plaster mold of the teeth, and then drilling the masks into position in the plants at the required angle.

[Full Text](#)

Title: Enhanced ultrawideband (UWB) micro-strip on-body wearable antenna

Author (s): Ajmal Hussain Shah, Suriyya Begum, Veeraiyah Thangasamy and Noor Ain Kamsani

Abstract: This paper presents an ultra-wideband micro-strip patch On-Body wearable antenna for medical applications using WiMAX. The antenna uses thick indigo blue jeans as substrate. The antenna is designed at the resonant frequency of 3.5 GHz. The dimensions of the antenna and the slit have been modified to achieve wide bandwidth. By doing so, not only the bandwidth of 15 GHz has been achieved but the antenna size is reduced by 13.4% as well. The proposed antenna simulation results including gain, directivity and radiation pattern are reported. The results show that the antenna not only provides satisfactory results for the WiMAX applications but also provides extremely good results including the VSWR of 1.12, the gain of 5.8 dB and the directivity of 6.8 dB at 20 GHz. The proposed antenna achieves a remarkable bandwidth as well as a significant size reduction. Hence, the proposed antenna can be used for medical applications using WiMAX as well as the applications operating up to at 20 GHz.

[Full Text](#)

Title: Aquifer size determination from material balance for gas reservoirs

Author (s): Freddy Humberto Escobar, Jorge-Andrés Tovar and Victor-Alfonso Andrade

Abstract: During decades, reservoir engineers have used the material balance equation, MBE, for estimating reserves, gas cap size and amount of water influx of oil and gas reservoirs. It has also been used as a tool for prediction the behavior and ultimate recovery of a given hydrocarbon reservoir and, since then, many modifications have been introduced to the MBE. In this work, a reservoir simulation study is conducted for a non-volumetric gas reservoir with different aquifer sizes so a correlation was developed for estimating the size of an underlying aquifer from material balance. The developed expression was successfully tested with field and simulated examples.

[Full Text](#)

Title: Design and implementation of fuzzy logic control based speed control of industrial conveyer

Author (s): B. Srikar Sudarsan, M. Sarath Kumar, Sudha Ramasamy and Prabhu Ramanathan

Abstract: This article presents a methodology and verification for implementation of a rule-based fuzzy logic controller applied to a closed loop DC motor speed control. The designed Fuzzy Logic Controller's performance is compared against with that of a PI controller. The importances of the Fuzzy Logic Controllers (FLCs) over the conventional controllers are: They are economically advantageous to develop

and implement, a wider range of operating conditions can be covered using FLCs, They are easier to adapt in terms of natural language. For Voltage / Speed control of the conveyor, a reference speed has been used and the control architecture includes rules. These rules portray a nonchalant relationship between two inputs and an output, all of which are nothing but normalized voltages.

[Full Text](#)

Title: Graphical user interface for wireless patient monitoring system using zigbee communication

Author (s): N. M. Z. Hashim, M. R. Anuar, A. Jaafar, M. Z. A. A. Aziz, A. Salleh, A. S. Ja'afar

Abstract: Nowadays, heart related diseases are on the rise situation. In Malaysia, the proportion of patients is increasing day by day but the number of doctor and nurse slightly different situation. For this reason, the new propose graphical user interface for wireless patient monitoring system is proposed in order to help doctors and nurses to monitor their patient wirelessly for 24 hours by using a designated proposed device. This system runs as prototype to minimize the costing issue in the hospital. This system consists of software and hardware. Visual Basic Net 2010 software is used to design the graphical user interface (GUI) and Peripheral Interface Controller (PIC) 16F877A microcontroller is used as the hardware to implement the whole proposed system. This system is can be divided into three parts. There are three stages that involved in completing the system. The first is developing a program for the microcontroller, the second is transmitting the data from microcontroller to the personal computer (PC) using XBee module and the third is designing the GUI. In conclusion, the proposed GUI for wireless patient monitoring system facilitated the doctor and nurse in monitoring the patient and increased the efficiency of patient monitoring. For the future recommendation, additional sensor and alarm buzzer shall be added to the system as triggering the observer of the system.

[Full Text](#)

Title: Studies undertaken to incorporate marble and granite wastes in green concrete production

Author (s): Garas G. L., Allam M. E. and Bakhom E. S.

Abstract: In the last 15 years marble, granite and natural stones wastes were estimated in Egypt as 100 million ton. These wastes were accumulated in wide areas that have a potential for new quarries thus hinder the sustainable development in the quarry areas. This study presents efforts undertaken in Egypt as well as other stone producing countries with an aim to adopt new ideas of re-using these wastes in the production of green concrete. Several attempts concluded the advantage of substituting these wastes to sand and cement in the concrete mix. Wastes improved the physical and mechanical properties of concrete due to its high fineness which provided good cohesiveness of concrete. Many tests revealed that 10% substitution of sand by the marble waste in the presence of a super-plasticizing admixture provided maximum compressive strength at the same workability level, comparable to that of the reference mixture after 28 days of curing. Regarding higher contents of stone slurry (substitution of more than 20% of sand), the decrease of compressive strength values was significant. Concrete mixes containing 30% red granite dust showed comparable compressive strength using natural or recycled aggregates, good workability, and excellent reddish colored surface finish. In general, the use of marble dust as sand replacement has more significant effect on the mechanical properties of concrete compared with using it as cement replacement.

[Full Text](#)

Title: Review on finite element analysis of sheet metal stretch flanging process

Author (s): Yogesh Dewang, M.S. Hora and S.K. Panthi

Abstract: This paper presents a review of finite element analysis of stretch flanging process and its finite element simulation, finite element formulation and finite element method (FEM) based parametric studies and their results. Stretch flanging process is secondary sheet metal forming process which is widely used in conjunction with other sheet metal forming process in sheet metal forming industry. It is used for making of automotive components and complex panels. In past researchers had worked on the area of finite element analysis of stretch flanging process in terms of development of FEM based computer programs and by using different commercial FEM software packages. It is observed that majority of finite element simulation for stretch flanging processes have employed explicit dynamic FEM approach. It is also found from FEM based parametric studies that geometrical parameters have greater influence upon the formability of stretch flanging process as compared to material parameters. Besides this, it is also observed that for manufacturing of stretch flange parts and components ferrous alloys were used in past, whereas aluminum alloys being used commonly in present scenario for obtaining corrosion free and lightweight with increased strength parts. Hence, it is found that analysis based on finite element method is a powerful, accurate and efficient technique for better designing of stretch flanging process.

[Full Text](#)

Title: A study on the development of a deodorization unit for the toilet bidet

Author (s): I. S. Hwang and Y. L. Lee

Abstract: Odorous toilet emissions are not convenient in modern, air-tight buildings. Thus, various deodorization methods are used but they do not provide a fundamental solution to the problem. In this paper, a novel deodorization method for bidet-attached toilets is proposed to enhance the deodorization performance of toilets. For this, experiments were conducted to evaluate the performance by attaching various fans and filters as well as passages to the bidet.

[Full Text](#)

Title: Energy analysis of a wheat processing plant in Nigeria

Author (s): O.S. Olaoye, A.A. Adefajo and S.O. Ekundayo

Abstract: Energy study was conducted in a wheat processing plant in Nigeria, to determine the energy consumption pattern for the production of flour. Process analysis method of energy was adopted to evaluate the energy requirement for each of the operations involved in the processing of wheat. The analysis revealed that eight defined unit operations were required for the production of wheat flour. The types of energy used in the processing of wheat flour were electrical and manual with the respective proportions of 99.87 and 0.13% of the total energy. Average energy intensity was estimated to be 0.101

MJ/Kg for the production of wheat flour. The most energy intensive operation was identified as the milling unit with energy intensity of 0.073 MJ/kg (72.20%) followed by the packaging unit using 0.015 MJ/kg (14.39%). Optimization of the milling process is suggested to make the system energy efficient.

[Full Text](#)

Title: Production of glues from animal bones

Author (s): Akpa Jackson Gunorubon and Uku Misel

Abstract: The environmental and health risks associated with improper handling of waste bones will be greatly reduced if bone wastes generated from the abattoirs are converted to useful products. Waste cattle bones have been successfully used in the production of glue. The quality of the produced glue was ascertained by testing for quality indicators such as moisture content, pH, density, ash content and viscosity. The values of these quality indicators were greatly improved on investigation of the effects of water quantity and ratio of glue volume to polyvinyl volume used. The values of these quality indicators for the final glue produced with the new raw materials mix compared favorably with values of standard glue with maximum deviation of 0.20 for the ash content.

[Full Text](#)

Title: An essence of software maintenance prediction using the fuzzy model for aspect oriented software

Author (s): Pradeep Kumar Singh, Om Prakash Sangwan and Abhishek Srivastava

Abstract: Software maintenance is generally used to refer the changes that are made to software after its initial release, installation and operation. In several research it has proven that maintenance involve more than 40 percent of the total cost of the software. External quality factors assessments were always in light from the beginning of the software engineering research and related to internal quality attributes. Several research papers used the internal attributes to derive the external attributes and their relationship have been discussed and validated in several quality models related research papers. This paper considered the major factors that affect software maintenance for Aspect Oriented Software's and divide them into four categories: Separation of Concern, Cohesion, Coupling and Size. Based on the identified factors, a fuzzy model to predict the software maintenance have been proposed and validated for aspect oriented software. Automated software maintainability examination to guide software related decision's was always in great demand and has been applied from procedural, object oriented to component based software engineering. In this paper a model to predict the maintainability has been proposed and validated using the fuzzy logic for automation of maintainability prediction for AO software.

[Full Text](#)

Title: On fabrication and testing of Glare

Author (s): Sunil Bhat and S. Narayanan

Abstract: Various aspects related to fabrication and testing of fiber metal laminate (Glare) comprising 2014-T6 aerospace aluminum alloy sheets alternately bonded with, epoxy resin impregnated, E-glass fiber based composite prepregs are discussed in the paper. Procedures adopted in processing of laminate ingredients and in fabrication of the laminate are elucidated. Experimental techniques for measurement of mechanical properties of Glare viz. tensile, flexural and shear strengths and interlaminar fracture toughness are reviewed. Pertinent results are presented. Energy dispersive X-ray spectroscopy of aluminum alloy and optical microscopy and residual stress measurement in aluminum layer of the fabricated laminate are touched upon. Viability of laminate fabrication method is proved by theoretically checking the quality of interfaces between un-identical material layers of the laminate.

[Full Text](#)

Title: Anisotropic Bianchi type-I cosmological model for viscous fluid in a modified Brans-Dicke cosmology

Author (s): Mohammed Ashraful Islam, G. M. Wali Ullah and Md. Sayeed Iftekhar Yousuf

Abstract: We present a new Cosmological solution for a Bianchi type-I Cosmological model filled with viscous fluid in a modified Brans-Dicke theory in which the variable cosmological term is an explicit function of a scalar field. The physical and geometrical properties of this model have been discussed. Finally, this model has been transform to the original form (1961) of Brans-Dicke theory.

[Full Text](#)

Title: Car stability controlled by fuzzy algorithm

Author (s): Eugenio Pezzutia and Giampiero Donnici

Abstract: This paper introduces an improved Electronic Stability Program for cars that can deal with the sudden burst of a tyre. The Improved Electronic Stability Program (IESP) is based on a fuzzy logic algorithm. The IESP collects data from the same sensors of a standard ESP and acts on brakes/throttle with the same actuators. The IESP reads the driver steering angle and the dynamic condition of the car and selectively acts on throttle and brakes in order to put the car on the required direction even during a tyre burst.

[Full Text](#)

Title: New model for elliptical flow regime in hydraulically-fractured vertical wells in homogeneous and naturally-fractured systems

Author (s): Freddy Humberto Escobar, Alfredo Ghisays-Ruiz and Luis Fernando Bonilla

Abstract: Pressure tests in infinite-conductivity hydraulically-fractured vertical wells allow for the estimation of the actual half-fracture length. If only elliptical flow is observed then the knowledge of the drainage area is

required for the analysis which could lead to have a longer test for observing late pseudosteady-state regime. Sometimes, it is unpractical to do so, then a new elliptical model excluding the reservoir area for the half-fracture length estimation is presented in this work for both homogeneous and naturally-fractured occurring hydrocarbon formations. *TDS* technique and conventional analysis were implemented for characterizing this flow regime. The resulting equations were successfully tested with synthetic pressure tests.

[Full Text](#)

Title: Design optimization of centrifugal fan of travelling cleaner

Author (s): C. N. Jayapragasan, Sumedh J. Suryawanshi and K. Janardhan Reddy

Abstract: Centrifugal fans play an important role in the proper functioning of any travelling cleaner. This study presents a design methodology to examine the performance of the fan using computational fluid dynamics approach. The effect of fan geometry, fan speed and fillet radius at the inlet on performance of the fan have been assessed. Number of blades and the volute dimensions has been kept constant. Total discharge and fan total efficiency are the output parameters calculated. In order to reduce the number of trials, Taguchi method is used. The fan is modeled using Solid Works 2012 and after simplification the modeled fan is meshed in ICFM CFD. The solution is obtained using FLUENT V6. The post processing is carried out using CFD POST and the results are presented and discussed in detail. Finally the using Minitab 16.0 the responses of parameters have been plotted and the optimum values of the parameters are obtained. These obtained values need to be implemented into the design for better performance of the fan.

[Full Text](#)

Title: Effect of plaster type and loading orientation on compression behavior of straw bales for construction

Author (s): Larisa Brojan and Peggi L. Clouston

Abstract: Plastered straw bales are composite building materials used as load bearing walls in sustainable structures worldwide. Structural testing of the composite is necessary to establish mechanical properties for practitioner use and for building code acceptance. This study investigates the compressive behavior of individual two-string rye straw bales when plastered using the most commonly used plasters in temperate climate zones, specifically: lime, lime-cement, and clay. A total of forty-eight specimens were tested to failure under compressive loading in two orientations: on-edge and flat. It was found that results vary not only according to plaster type but also according to bale orientation: on edge bales tended to fail due to buckling of the plastered skins while flat oriented bales failed primarily due to plaster crushing. Importantly, all cases exceeded the maximum load capacity proposed for the 2015 International Residential Code with the lowest factor of safety being 1.8 for on-edge oriented clay plastered bales. Flat-oriented bales plastered in lime-cement were found to have the highest compression capacity, with a factor of safety of 10.7.

[Full Text](#)

Title: Child in car alarm system using various sensors

Author (s): N. M. Z. Hashim, H. H. Basri, A. Jaafar, M. Z. A. A. Aziz, A. Salleh and A. S. Ja'afar

Abstract: The network service system is increasingly extended as the demand from various of usage is growing. Although many products had been invented, there are still the incidents that involve to death of children which been left in cars often occur. The system is designed in order to overcome this unwanted incident from happening. The proposed system is designed to detect sound or voice and any movement made by the children that had been left behind in a vehicle. The main target of the system is to create a complete system which uses Global System for Mobile Communication (GSM) that can communicate with human. GSM modem is the medium to interact and communicate with the module. It is used to send and receive Short Messaging System (SMS) based on which appropriate actions taken by the user. PIC microcontroller performs as heart of whole controlling system. The system at the final stage can be used to detect the sound that had been produced by a human at optimum strength. In addition, it was also able to detect motion that performed by a person and can detect any sounds that produced from inside the car. The system that has generated is expected to continue to expand with concomitant change in time with the developed and equipped with a great technology. It is envisaged that the system is able to overcome the problem of accidents involving children that often left in the car.

[Full Text](#)

Title: Tuning of PID controller for a synchronous machine connected to a non-linear load

Author (s): Gowrishankar Kasilingam and Jagadeesh Pasupuleti

Abstract: This paper proposes a method of determining the optimal proportional integral derivative (PID) controller parameters using the particle swarm optimization (PSO) technique. The stability of the power system is an important factor in the operation of any electric system. A PID controller with a power system stabilizer (PSS) has been developed to maintain the stability and enhance the performance of the power system. Optimization of PID parameters is an important problem in control engineering. A PSO algorithm has been proposed to tune the parameters of the PID controller. The effectiveness of the PID-based PSS has been tested on a single-machine infinite-bus (SMIB) system having a three-phase thyristor-based non-linear load with different kinds of faults. Analysis shows that the dynamic performance with the proposed method is better compared with the conventional trial-and-error method. The speed deviation, rotor angle deviation and load angle were compared in a Simulink-based MATLAB environment. The simulations show that the proposed method damps optimally and suppresses errors to a minimum.

[Full Text](#)

Title: The survey of optimal decision technique for solving computational problems: The applications of Einstein's general theory of relativity

Author (s): G. M. Wali Ullah

Abstract: The paper surveys computational procedures for the optimal decision problem. Advantages of Ying. et all's proposed concept, are illustrated. The proposed algorithm is encouraged by a simulation of several

asteroids shifting within a universe to search for the body with heaviest mass. By referring to the Einstein's general theory of relativity, an algorithm is designed to obtain optimal point.

[Full Text](#)

Title: Fem analysis for critical components in engines systems

Author (s): Eugenio Pezzuti and Giampiero Donnici

Abstract: This paper introduces a method to simplify a nonlinear problem in order to use linear finite element analysis. This approach improves calculation time by two orders of magnitude. It is then possible to optimize the geometry of the components even without supercomputers. In this paper the method is applied to a very critical component: the aluminium alloy piston of a modern common rail diesel engine. The method consists in the subdivision of the component, in this case the piston, in several volumes, that have approximately a constant temperature. These volumes are then assembled through congruence constraints. To each volume a proper material is then assigned. It is assumed that material behaviour depends on average temperature, load magnitude and load gradient. This assumption is valid since temperatures varies slowly when compared to pressure (load). In fact pressures propagate with the speed of sound. The method is validated by direct comparison with nonlinear simulation of the same component, the piston, taken as an example. In general, experimental tests have confirmed the cost-effectiveness of this approach.

[Full Text](#)

Title: Identifying recent developments in knee prostheses through a patent analysis

Author (s): Marisela Rodriguez and Alejandro Palacios

Abstract: Artificial knees represent an important issue for a global technology trends analysis. On average, the growth rate of knee replacement surgeries increased by nearly 50% over the past decade in Organisation for Economic Cooperation and Development (OECD) countries. This study focuses on a patent analysis as a part of a Competitive Technical Intelligence methodology. The aim is to provide organizations in this industry with insights on knee prostheses research, particularly to determine the most active patenting entities as well as their focus of research. The topmost in each category: inventors, organisations, technology classifications, advanced materials and top keywords were determined.

[Full Text](#)
