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Management & Information Technology

463 Evaluating the Commercial Potential of Original Technologies in Universities

The study aimed to propose a technology evaluation framework consisting of a hybrid fuzzy multi-criteria decision making (fuzzy MCDM) approach to evaluate and prioritize the optimal alternatives with best commercial potential. The fuzzy Delphi method was first used to determine the three dimensions and nine important decision criteria. Next, the fuzzy analytic hierarchy process (fuzzy AHP) results indicated that the top three dimensions are accordingly "technological innovation", "business development" and "operating management". The top three important criteria are "technological origins", "potential impact" and "technological competence" respectively. Finally, the fuzzy technique for order preference by similarity to ideal solution (fuzzy TOPSIS) results revealed that T2 and T4 are the two optimal alternatives with best commercial potential for further funding and commercialization. The proposed technology evaluation framework could serve as a reference to both government administrative agencies and university practitioners for the future evaluation of commercializing original technologies.



Y C Lee, Grace T R Lin, P H Hsi & S S Lin

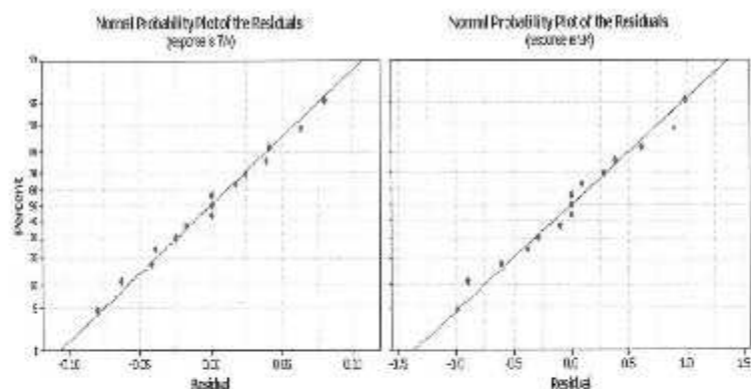
466 Long-term Implications of Highway Quality and Length in the Growth of Indian Manufacturing Sector: A System Dynamics Analysis

India, with five million kilometers of length, has the world's second largest road-network. However, the highways in India are capacity constrained, slow, less safe, environmentally unfriendly, not maintained or non-maintainable and patchily administered. Improvement in transportation efficiency brings down the logistics cost, making the product more cost-competitive thereby encouraging economies-of-scale, which in turn provides the impetus to manufacturing growth. To understand the long-term implications of the quality of highways, the length of its new-construction and its related factors on the nation's manufacturing growth, a System Dynamics approach has been used in the paper. The eight scenarios simulated in the model are expected to provide useful insights to the road-transport planners and the policy makers of the nation.

R Ojha, P Vrat & N Sharma

475 **Modeling of EDM Progression on Heat Resistant Super Alloys Using Response Surface Regression**

Inconel 600 has been widely applied in aerospace industry and nuclear reactor due to its superior high temperature mechanical properties such as resistance to oxidation and corrosion, high tensile stress and rupture stress etc. But, machining of Inconel 600 is very difficult to machine material. Electric Discharge Machining (EDM) is one of the most extensively used non-conventional material removal process and current, pulse on time and pulse off time are the parameters that affects the quality of the machined component. Modeling of the EDM operation is essential for improving the quality of product while machining Inconel 600. Response surface methodology (RSM) incorporating statistics tool in design and executing experiments is proved. The Taguchi technique is very attractive and effective method to deal with responses influenced by number of variables. So, in this investigation, optimum parameters were obtained using Taguchi techniques and regression coefficient was obtained using response surface regression.

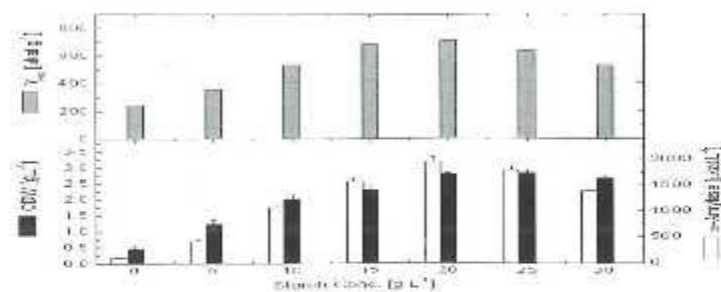


P Marimuthu, M Robertsagayadoss, N E Edwinpaul & K Chandrasekaran

S & T and Industrial Research

480 **Optimization of fed-batch cultivation strategy for extracellular α -amylase production by *Bacillus amyloliquefaciens* in submerged culture**

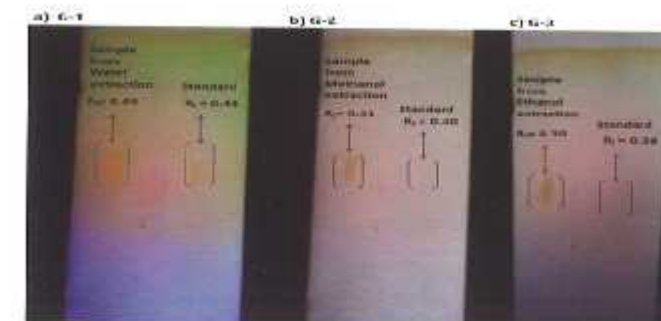
Alpha amylase (E.C. 3.2.1.1) is one of the most important starch-degrading enzymes and widely applied in pharmaceutical, food, feed, detergent, textile and bio refinery industries. The present work was focused on optimization of α -amylase production using the bacteria strain *Bacillus amyloliquefaciens* in submerged cultivation system. The results showed that, the optimal soluble starch concentration for maximal enzyme production of 1950 μ kat.L⁻¹ was 20 g.L⁻¹. Compared to shake flask, bioreactor batch cultivation yielded higher volumetric enzyme production of 4125 μ kat.L⁻¹ (about 1.84-folds higher than the value obtained in shake flask). In addition, fed-batch cultivation with two feeding strategies (constant feeding and increased feeding) was also designed to improve the production process. The maximal volumetric enzyme production of 8160 μ kat.L⁻¹ was obtained in increased feeding strategy after 36 hours of cultivation. This value was almost 98 and 18% higher than the enzyme produced in batch and constant feeding fed-batch cultivations, respectively



E A Elsayed, H G Omar, S A Galil & H A El-Enshasy

487 **Evaluation of Phytochemical, Antioxidant and Antimicrobial Properties of Glycyrrhizin Extracted from Roots of *Glycyrrhiza Glabra***

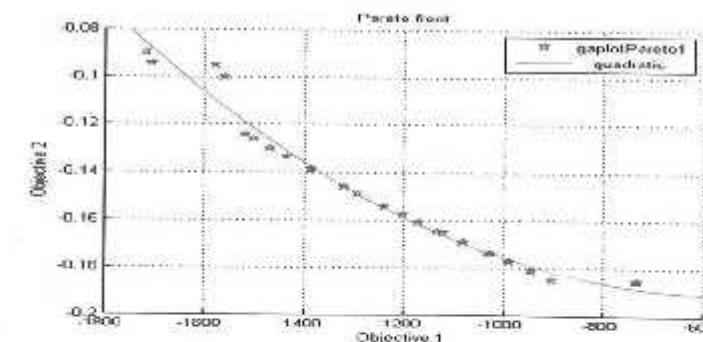
Ultrasonication has been proved as the best and relevant method for extraction of the glycyrrhizin. To optimize the process conditions for the maximum yield of the glycyrrhizin and easier purification, three types of solvents were employed such as water, methanol and ethanol coded as G-1, G-2 and G-3 and extraction was carried out at different time (45, 60 and 120 min). Maximum amount of glycyrrhizin was recovered from licorice roots at 45 °C for 45 min of extraction time, yielded good amount of glycyrrhizin 36.46 ± 1.29 % using water as solvent. In the present work TLC method assessed the purity of the extracted dried sample compared to the licorice standard. The FTIR spectra of the present study indicated that the control/standard of glycyrrhizin was exactly in resemblance with G-1 spectra. The phytochemical screening of extracted glycyrrhizin was conducted which indicated the presence of saponins, flavonoids, steroids and absence of carbohydrate sugars, alkaloids, tannins and proteins in G-1. The glycyrrhizin extracted using different solvents has shown effective antibacterial action on all six microorganism. The antioxidant activity of each sample was determined using DPPH and ABTS scavenging assay. The presence of flavonoids in the plants is likely to be responsible for the free radical scavenging effects observed. Although, it was found that G-1 attained maximum free radical scavenging ability against reactive oxygen species (ROS).



D Thakur, Abhilasha, A Jain & C Ghoshal

495 **Optimisation of Pressure and Oil Film Thickness in Multilobe Bearing using Response Surface Methodology and Moga**

The performance of a bearing depends upon its load bearing capacity without compromising the friction. As the load increases, oil film thickness decreases owing to increase in oil pressure causing an adverse effect on bearing performance. In multi lobe bearing oil pressure is released by draining the oil through the lobes. Thus, an optimum oil film thickness can be maintained while increasing the load bearing capacity. An attempt has been made to optimize the oil film thickness after satisfying the condition of maximizing the pressure in three lobes bearing using a genetic algorithm. It gives optimum result and their respective parameter configuration.

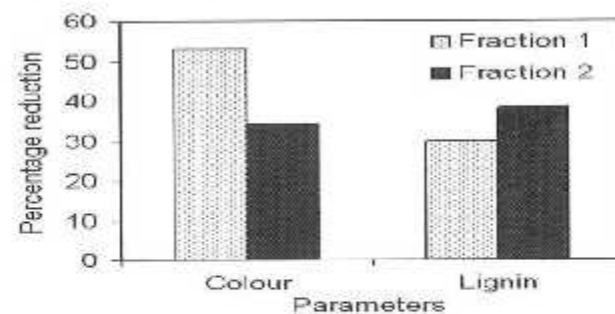


N Biswas, P Chakraborti & P Dhar

Energy and Environment

500 Characterization of Lignin Peroxidase from *Paecilomyces* Species for Decolorisation of Pulp and Paper Mill Effluent

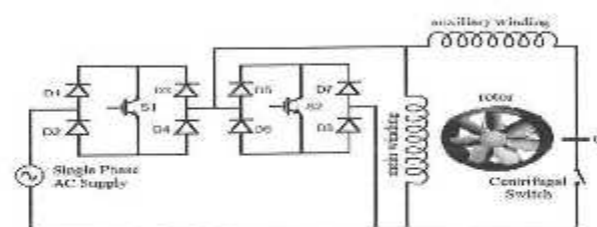
Native fungal isolates F1 - F8 and control fungi *Phanerochaete chrysosporium* were capable of degrading pulp and paper industry effluent and also efficient producers of cellulolytic and lignolytic enzymes. F3 (*Paecilomyces* sp) strain showed higher enzyme activity as compared to other native fungal isolates. Weight loss, cellulose loss and organic carbon contents were found maximum in F3. Reducing sugar, protein content and colour removing potential was also higher in F3. Color reduction initiated very fast with microbial enzyme treatment (initiated only after 2h of incubation) and reached maximum reduction after 24h. Lignin peroxidase fraction I and II resulted in 53% and 34% removal of colour and 36% and 38% lignin removal. The culture extract of F3 strain grown on pulp and paper effluent consists of five protein fractions and out of them two fractions of 38 and 40 kDa molecular weight showed lignin peroxidase activity. The pH and temperature optimum for lignin peroxidase activity were 2 to 3, and 20 - 30 °C, respectively. Maximum activity was observed at 6 mM to 48 mM veratryl alcohol concentration and 255 mM H_2O_2 , however, sodium azide inhibits the enzyme activity. Different metals ($CoCl_2$, $HgSO_4$, $CaCl_2$, $SnCl_2$, $FeSO_4$, $CuSO_4$ and $ZnSO_4$) also affected the lignin peroxidase activity.



P Singh, P Jain, R Verma & R S Jagadish

506 Experimental Validation of Power Quality Improvement in the Domestic and Industrial Fan Load

Power quality is not a big problem for low power motors and it becomes a problem in the places where multiple motors are in operation. In this paper, Genetic Algorithm is used to identify the best switching angles to eliminate selected harmonic in the output of the AC chopper. Load value is not mandatory to be known to calculate the switching angles are one of the main advantages of the proposed algorithm. Total Harmonic Distortion of output voltage is calculated from the obtained switching angles and embraced in the proposed fitness function. AC chopper with single phase induction motor model is developed in the MATLAB/SIMULINK environment. High quality output is derived due to the absence of low order harmonics. High efficiency is also achieved by the induction motor drive when it is operated with the proposed technique. Simulation results are validated through the designed prototype in which Genetic algorithm is implemented with the FPGA controller. Simulation and experimental results show that the proposed technique is effective.

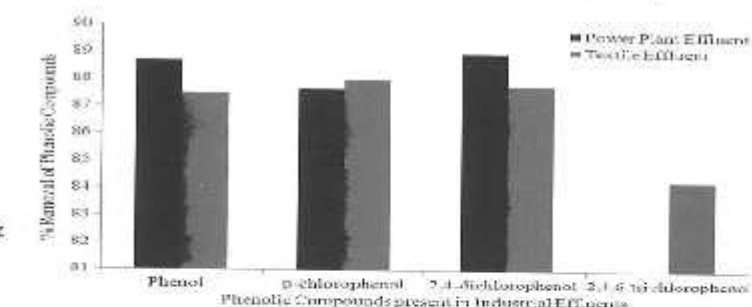


S Mahendran, I Guanambal & A Maheswari

Waste Utilization

512 RSM Studies on Phenol Removal from Aqueous Solution and Removal of Phenolic Compounds from Industrial Effluents by Ionic Liquid [Bmim][BF₄] Dissolved in Tributyl Phosphate

Response surface methodology (RSM) was employed to optimize the removal of phenol from aqueous solution by ionic liquid [Bmim][BF₄] dissolved in TBP. Central Composite Design (CCD) with four variables (aqueous phase pH, agitation speed, feed concentration, treat ratio) was applied to optimize the extraction process. The optimized conditions for maximum removal of phenol were pH - 6, agitation speed - 350 rpm, feed phase concentration - 10 ppm and treat ratio - 5 respectively. The optimized response for removal of phenol was found to be 98.88 % and the experimental result was found to be 98%. This shows the best fit with the proposed statistical model for phenol removal ($R^2=0.983$). Extraction studies were performed for the removal of phenol, p-chlorophenol (p-CP), 2, 4-dichlorophenol (2,4-DCP) and 2,4,6-trichlorophenol (2,4,6-TCP) from synthetic phenolic mixtures, power plant effluent and textile effluent using [Bmim][BF₄] in TBP. The results showed that the percentage extraction of phenols from synthetic mixtures and industrial effluents were found to be 98%, 88% and 86% respectively. Based on the above results, it was found that this process was best suited for secondary or tertiary treatment of phenols from industrial wastewater before disposal.



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519 Instructions to contributors