Journal of Scientific & Industrial Research

CONTENTS

### Management & Information Technology

In this paper, we study a question related to the execution of jobs in computing clusters built from servers with multi-core processors. Scenarios where a single job is executed or multiple jobs are simultaneously processed by multi-core processors are investigated. Workloads based on captured traces are used in our study. Numerical results demonstrate that the computing resources are efficiently utilized in a multiple job executing scenario and the setup time has a slight impact on the average response time of a computing cluster. Furthermore, a scenario where multiple jobs are simultaneously executed by cores and Dynamic Power Management (DPM) is applied for each processor core yields the most efficient energy consumption. As a consequence, schedulers should take account the feature of multicore processors to save the energy consumption of computing clusters.
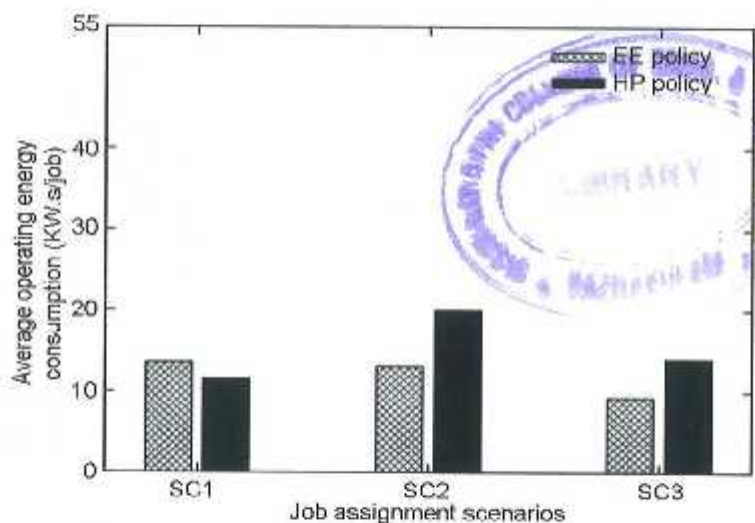
X T Tran, Tien Van Do & R Chakka

The present work carries on the use of a method based on the wavelet transform to detect internal flaws of composite materials. The objective of this work consists in working out a data processing sequence of an ultrasonic signal identifying nearly flaws in composite laminate materials and estimating their position. The use of a numerical signal processing technique, based on the Fast Wavelet Transforms was applied. The method was implanted and optimized for detection and classification of delamination and porosity flaws in manufactured materials. Since the information about the signal requires a large amount of computation time and resources, a technique was used to reduce the dimensions of the sampling signals. In Non-destructive evaluation of stratified composite materials, the identification of some defect features requires more recent and advanced methods than classical techniques.

signal with delamination
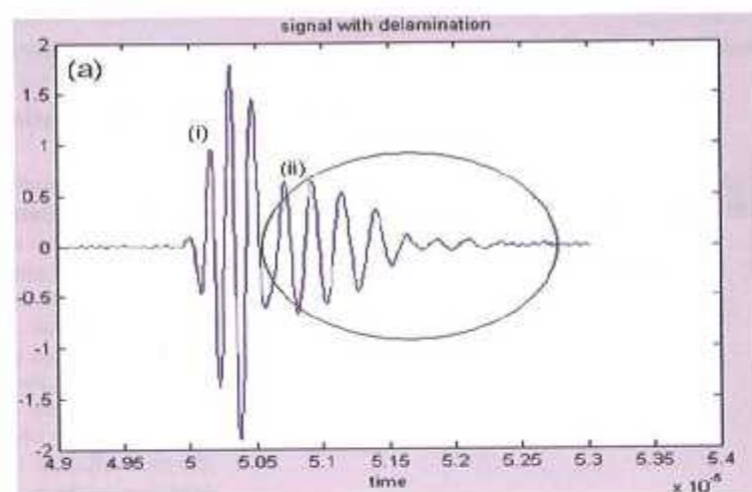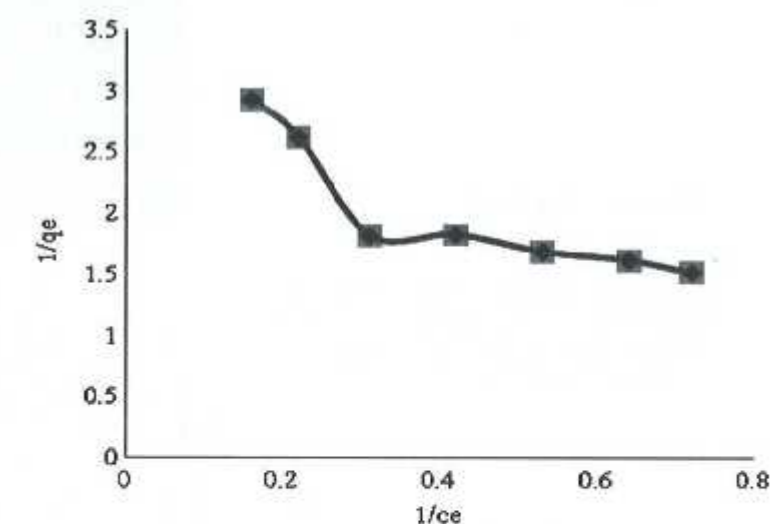
A Yahiaoui, M S C Med & S Laddada

One factor of quality and quantity reduction in crop yields is plant disease. Consultation with plant pathologists to diagnose plant diseases is time consuming, considering that time is an important factor in disease control. Therefore, it is necessary to present a simple, fast, cheap, and precise method for diagnosing plant diseases. In this article, five corn leaf diseases (Southern Leaf Blight, Southern Rust, Gray Leaf Spot, Holcus Spot, and Stewart's Wilt) are diagnosed using image-processing techniques. After collecting and transferring the diseased leaves to the laboratory, the images of leaves are produced under controlled conditions of light. In the following, four different methods are used to diagnose the disease and then the results are analyzed and compared. In the first proposed method, the damaged areas are separated using histogram equalization method and then a two-layer perceptron neural network classification system is used to categorize the final results and diagnose the disease. In the second method, Laplacian and Canny filters are used to separate the damaged areas. In the third method, the principal components analysis method is used and finally in the fourth method, a combination of Gabor filter and visual features is used to diagnose the disease.

S A Mousavi, Z Hanifeloo, P Sumari & M R M Arshad

S & T and Industrial Research

Antibiotics have been considered emerging pollutants due to their continuous input and persistence in the aquatic ecosystem. The present paper addresses the degradation and removal processes applied to a specific class of micropollutants, the antibiotic tetracycline (TETRA). Photocatalytic degradation of tetracycline in aqueous suspensions of titanium dioxide in the presence of titanium dioxide (TiO_2) and ultraviolet (UV) illumination was performed in a vertical circulating photocatalytic reactor. The optimum catalyst concentration was about 0.1g/L. The disappearance of tetracycline follows a pseudo-first-order kinetics according to the Langmuir–Hinshelwood (L–H) model. The activated energy for the photocatalytic degradation of tetracycline is 24.17 kJ/mol.

R Jain, S Sikarwar & S Goyal

The presence of naturally occurring halometabolites in the marine environment has led to studies focusing on the search for organisms capable of biocatalyzing halogenation reactions. In this study, we isolated two marine sediment bacteria (WK7 and WK12) from Mokpo, Jeollanam-do, South Korea with 99% identity to parts of the 16S rDNA of bacterial species *Shewanella marisflavi* and *Pseudoalteromonas prydzensis*, capable of biohalogenation activity based on the monochlorodimedone (MCD) assay. Isolate *P. prydzensis* WK12 (KP893638) produced compounds from indole with molecular ion peaks m/z 262.06 and 342.03 possibly corresponding to indigo and monobromoindigo. Likewise, *S. marisflavi* WK7 (KP893637) was speculated to have produced indigo and dibromoindigo (m/z 262.4 and 420.57) from indole. This is the first report on marine sediment bacteria capable of biocatalyzing bromination of indole as resting whole cells.

L H Galarion & W L Rivera

Highly effective blast-absorbing materials are demanded by the industry, as they can improve blast resistance of structures. There are two ways of improving the blast resistance of a structure – either to enhance the performance of the structural materials, or to use sacrificial cladding structures with the core made of the highly blast-absorbing material. Presented study deals with the influence of nanoparticle addition on physico-mechanical properties of a foam composite designed for blast energy absorbing applications. Specific porous lightweight foam with high volume fraction of microspheres was prepared and modified by 1 to 5 vol. parts of multi-wall carbon nanotubes or nanosilica.
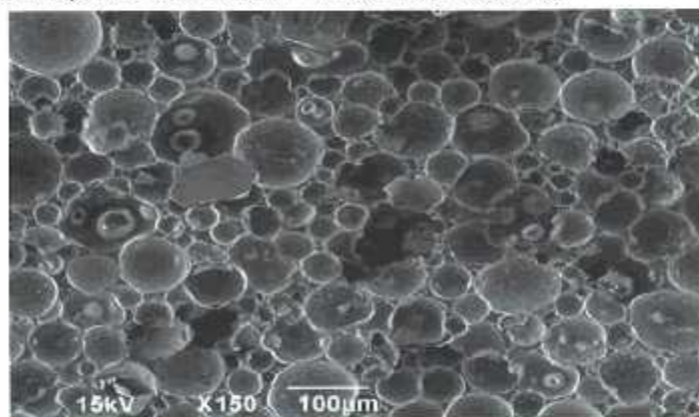
α-amylases are one of the most important enzymes used in industries. Bacterial amylases have potential application in food, fermentation, textiles and paper industries. Considering these facts the present study was designed to isolate and screen amylase producing bacteria from soil followed by optimizing physiological conditions for enhanced bacterial growth and amylase production. Garden soil was collected and grown on starch plates and the zone of starch hydrolysis was noted. Among 10 isolates, SS4 isolate showing maximum amylase activity was characterized microscopically and biochemically. Based on these results SS4 isolate was confirmed as *Bacillus subtilis*.
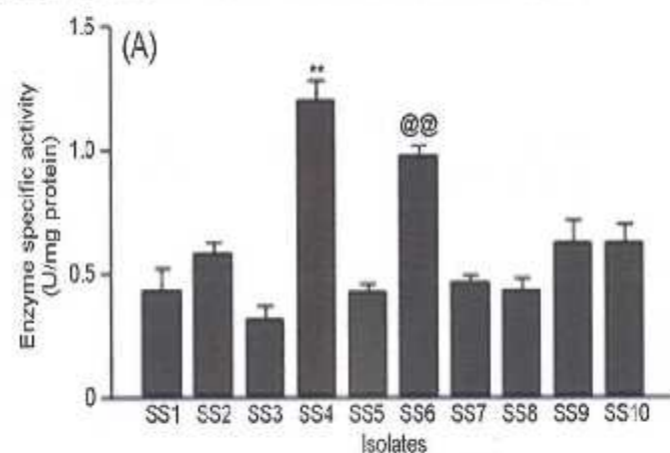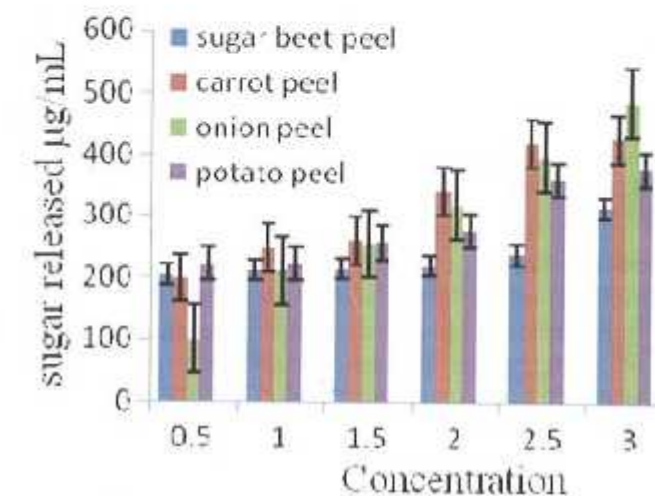
Waste Utilization

It has been stated that about 600,000 tones of solid waste is being generated worldwide by the leather industry in which 40–50% of the hides are lost due to shavings and trimmings. Basic Trivalent Chromium (Cr (III)) sulfate is widely used as tannage material. Only 60–80% of the total Chromium (Cr) reacts with the hides and about 20–40% of the total Cr remains un-reacted in the liquor. Chrome shavings (CS) are the scrap generated during leveling of tanned skins, and mainly consisting of collagen cross linked with Cr (III). As of now, there are insufficient report and researches on the use of leather industry waste in bituminous mixes. This study focuses on the use of CS as filler in micro surfacing for pavement preservation, to overcome the burden of CS disposal.

Agro wastes such as carrot peel, onion peel, potato peel and sugar beet peel are products subjected to saccharification process by *Penicillium sp.* for the hydrolysis, this process was followed by the fermentation using yeast *Saccharomyces cerevisiae* for the production of alcohol which was fermented at 14, 21, 28 days to produce alcohol. The aim of the study was to determine alcohol content of fermented agro wastes based on different fermentation time. The fermented product was purified by primary distillation process at $78^{\circ}C$ and the fraction was collected.

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