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ABSTRACT OF PAPERS

Heat-gradient, analytical technique for the simultaneous determination of some aromatic amines

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Abstract

A new and sensitive analytical technique has been developed for the simultaneous determination of aromatic amines (aniline, p-nitroaniline, m-nitroaniline, o-nitroaniline, 1,3 phenylenediamine, and 1, 4 phenylenediamine). It is based on the differential migration of coloured derivatives formed by the reaction of diazotized amines with 8-hydroxy quinoline 5-sulphonic acid (FERRON) on a silica gel plate. Quantitative evaluation of amines is made by visual comparison of intensities of colour by spectrophotometry. The Beer's law, molar absorptivity and Sandell sensitivity have been determined. The effect of analytical parameters on migration and analysis has been evaluated. The method is highly reproducible and has been applied to determination of amines in environmental samples.

Optical Absorption Spectra and X-ray Diffraction of CdS: Mn Doped Nanoparticles

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Abstract

Cadmium sulphide nanoparticles were synthesized by a chemical precipitation method at room temperature. Scanning electron microscope showed that particles are indeed nanosize particles. The particles size was estimated at 18 Å to 40 Å diameter from peak broadening of the xray diffraction (XRD) pattern. The variation of particles size dependent on concentration of mercaptoethanol. The size dependent band gap could be varied from a bulk value of 2.4 to 3.98 eV.

Synthesis of Automobile Powered Steering Mechanism Via Reliability Concept

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Abstract

The synthesis of any mechanism is usually carried out either by the precision point approach or by using optimization technique. The use of the concept of reliability for synthesis of automobile powered steering mechanism with control on maximum permissible error is presented in this chapter. Being simple with this approach, mechanism can be designed to perform with any desired reliability. The application of approach is illustrated by means of a numerical example. A digital simulation has also been presented for the approach.

Application of Fuzzy Logic in Rainfall-Runoff Modeling for Ravishankar Sagar Reservoir

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Abstract

India is bestowed with rich water resources but more than eighty percent of the rainfall over the country falls in four monsoon months from June to September. Because of time and spatial variability of rainfall, a number of dams have been constructed all over the country to tap the available water resources so that this water can be utilized in accordance with the requirements of mankind. Modeling of a rainfall-runoff is gaining a fast momentum for hydrological and water management studies. Rainfall-runoff relationships are widely used in many engineering hydrologic designs. Such relationships are obtained through the application of regression analysis in many studies. Unfortunately, in the classical regression approach to determine rainfallrunoff relationships, internal uncertainties are not taken explicitly into consideration. For this, an alternative to the classical regression approach is proposed through fuzzy logic modeling. The development of Fuzzy model and its application has been presented for basin of Ravishankar Sagar of MRP complex on Mahanadi River at Dhamtari district of Chhattisgarh State in India.

Identification and Management of Critical Sub-Watersheds Through GIS And SWAT Model

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Abstract

Adequately tested Soil and Water Assessment Tool (SWAT) model was used in this study for developing effective management plan for the identified critical sub-watersheds of Arang watershed. The critical sub-watersheds were identified on the basis of average annual sediment yield and nutrient losses. Out of ten sub-watersheds, SWS-5 and SWS-7 were found to be critical. Simulated runoff, sediment yields and nutrient losses showed similar trend for both the critical sub-watersheds. Therefore, only one sub-watershed (SWS-5) was considered for presenting the results in this paper.

Several combinations of treatment options were considered which included four crops, five tillage and three levels of fertilizer. The existing management practice was considered as the base for evaluating other management practices for rice. The results showed other crops couldn't replace rice since these crops resulted in higher sediment yield as compared to rice. Considering both sediment and nutrient losses together the zero tillage, conservation tillage and field cultivator with half dose of fertilizer (40:30 of N:P kg/ha) were found to be better than the other treatments considered for evaluating their impact on sediment yield and nutrient losses for sub-watershed (SWS-5).

Results revealed that the model was predicting the monthly and seasonal surface runoff and sediment yield satisfactorily. Simulation results of nutrients including organic N and P in sediment and $\text{NO}_3\text{-N}$ and soluble P in runoff were also compared with observed data for several events and found satisfactory.

Study on Sorption of Copper on a Vertisol Soil: Part-I

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Abstract

A study on copper sorption on a major soil type of Chhattisgarh — *Kanhar* (Vertisol), is presented. The various soil characteristics exhibit that the parameters affecting sorption — natural pH, clay content, dominating minerals, carbonate content, organic carbon content, cation exchange capacity, and the total specific surface area are in favour of *Kanhar* having good sorption capacity for metals. Considering the dominant mineral montmorillonite having 2:1 clay structure the soil appeared to be carrying permanent negative charge independent of the pH values that are possible in natural conditions. Sorption kinetics experiments revealed that for copper maximum sorption (about > 90%) occurs within 240 minutes under the experimental conditions and after equilibration for two days the metal appears to reach constant concentration for the applied dose resulting in 98% removal of the metal. In the experiments on pH sorption edge effect, copper sorption increases between pH of 4.5 and 6, with pH near value 5.5 showing the earliest maximum sorption. The sorption isotherm experiments illustrated that sorption was very good at the lower applied concentration of metal (up to 50 mg L^{-1}), as described by H-type shape of the isotherm curve. Both, Freundlich and Langmuir isotherms fitted well, with Freundlich showing better fit.

Performance Study of an up-flow hybrid Anaerobic Reactor based on Seasonal Variations

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Abstract

This paper describes study of the seasonal effects, on the performance of a full scale hybrid reactor in the treatment of vegetable market waste mixed with domestic sewage. The reactor is having a 14.726cu.m granular sludge bed (GSB) and a 49.087cu.m egg tray filter bed packing (FB). The influent to the reactor and the effluent from the reactor was assessed for a period of one year with respect to various performance parameters. The results obtained reveal a removal efficiency of 50% with respect to the total COD fraction under dry weather conditions and about 48% in winter months.

Long Range Summer Monsoon Rainfall Forecasting over Subdivision Chhattisgarh by Deterministic Neural Network

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Abstract

Attempts to forecast long-range monsoon rainfall over the subdivision, Three layer perception feed forward back propagation deterministic artificial neural network models have been developed. 61 years data for 1945–2006 have been used, of which the first 51 years (1945–1995) of data are used for training the network and data for the period 1996–2006 are used independently for validation. We have found that the mean absolute deviation (% of mean) of the model is less than and half of the standard deviation (% of mean) in the independent period (1996-2006) of the subdivision in deterministic forecast. Correlation between actual and particular model predicted values are more than 0.8 for the districts and 0.7 for the whole subdivision in deterministic forecast. The models developed and their evaluations have been presented in this paper.

Application of Artificial Neural Network in Locating Single Line-to-Ground (SLG) Faults on Double Circuit Transmission Line

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Abstract

An accurate algorithm for fault location of single phase-to-ground fault on the double end fed double circuit transmission line is presented. Artificial Neural Network is developed which employs the fundamental components of three line voltages and the six line currents of the two parallel lines at one end of the line. This approach does not need any information from remote end nor is zero sequence current compensation required. The performance of the proposed scheme has been investigated by a number of offline tests. The Simulation results show that single phase-to-ground faults can be correctly located after one cycle after the inception of fault. The complexity of the possible types of

faults A1G, A2G, B1G, B2G, C1G and C2G, fault locations, high path fault resistances, fault inception angles, mutual coupling effects and current in-feed are solved. Matlab® models the power system and simulates different fault conditions.

Transient Control Techniques in Synchronous Wind Turbine Generators

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Abstract

The quality of the power output in a wind power system can be improved if adequate controls are incorporated in the system. The fluctuating wind generator output needs to be controlled. This paper deals with the dynamic analysis and control of variable speed wind turbine system for transient studies. A MATLAB model has been developed for simulation and analysis of a wind power system. The simulations were carried out first for an uncontrolled wind generator and then with various commonly used control techniques like blade pitch control, converter/inverter control and the combination of pitch and converter/inverter control. The results are presented and important conclusions have been drawn.

Growth Rate Simulation in an LPCVD Reactor for Epitaxial Process of Silicon

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Abstract

Among various techniques used for epitaxial deposition during VLSI fabrication, Low Pressure Chemical Vapour Deposition (LPCVD) has been drawing the attention of many workers in the field of VLSI Process simulator.

The present work deals with decomposition of SiH_4 at low pressure inside a cylindrical reactor. The growth process depends on the chemical properties of the reactant and their dependences on pressure and temperature, flow dynamics and temperature gradient inside the reactor, geometry of the reactor etc. A comprehensive mathematical model depicting the growth rate has been developed considering the effects of the above mentioned parameters and the dependences of the growth rate on pressure inside the reactor, placement of the substrate, flow rate of the reactant gas has been analyzed.

The resulting data thus obtained using the mathematical model developed has been found to be in good agreement, with appropriate physical conditions, with the data as available in the existing literatures.

A Genetic Algorithm For Social Topological Characteristics For the Effectiveness Of The Organization

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Abstract

Network analysis has recently become an increasingly accepted tool for organizational analysis, as it allows for studying relevant both social and other interactions within, as well as across, organizational boundaries. Genetic algorithm is used to examine interactions of formal structure and social networks, among individuals and team/groups as well as to review important methodological aspects in organizational studies. The computational effort involved is minimum. The method is unique as it satisfies both the necessary and sufficient requirements. Fitness of a binary string corresponding to a actor is indicative of its design parameters. Consequently the fitness of a structure in organization indicates the number of parameters active in communication generation. Topologies are compared for establishing effective communication on the basis of the fitness of various connections among the actors. It is tested if hierarchical distance influences both personal communication and whether or not the communication is reciprocated.

Numerical Investigation of Non adiabatic Capillary Tube Flow of Domestic Refrigeration System

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Abstract

A Numerical Investigation of Non adiabatic Capillary tube flow of domestic refrigeration system is help to evaluate the performance of refrigeration system under various parameters. The refrigerant flow inside the capillary tube is very complex especially in non-adiabatic situations, where the capillary tubes are in thermal contact with the suction lines connecting the compressor. From comparison of results obtain by Cicchitti and Mc Adams Viscosity model with experimental value obtain by mikol (1), it is clear the Ms Adoms viscosity model predicts the capillary length more accurately than the commonly used Cochiti model length of capillary tube required for Non-adiabatic case is larger than that required for adiabatic flow.

Stress Mitigation In Infinite Thin Plate With Two Circular Holes Under Tensile Loading

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Abstract

High stress concentration factor develops along the periphery of the circular hole. It is also established in literature that stress mitigation can be achieved by removing materials from the vicinity. Variation in geometry is a common observation in the field and occurrence of plates with single hole is a chance. In the present work, the stress mitigation is attempted for plate with two circular holes and effect of different parameters i.e. radius of the relief hole and distance between the relief holes have been determined using FEA software ANSYS.

Analogy between rolling mill and exponentially and uniform transmission lines parameters

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Abstract

Electrical power flow per unit time in a transmission line remains constant. In continuous rolling mill it is also true that metal flow per unit time in different rolling stands remains constant. By acquiring this basic similarity, an analogy has been developed in between different parameters of exponentially tapered and uniform transmission lines and that of rolling mill. This analogy may be useful in finding out and setting the complex parameters during rolling otherwise it takes hours together to establish the smooth rolling for desired cross section. The uniform as well as exponentially tapered transmission lines are well defined therefore different parameters and different conditions of rolling can be simulated by varying input voltage and current and subsequently one can observe the their corresponding values at different sections of transmission lines. A study has been made based on this analogy for simulating the different conditions of complicated steel wire rod mill consisting of 23 rolling stands. The analogy is also useful to predict the two extreme conditions like breakage of metal due to inter stand tension and looping due to inter-stand compression without wasting any costly metal therefore prompt action could be taken to avoid the cobble and increase the productivity. The other parameters like skid of metal at entry of rolls, development of pipes in rolled metal and wear and tear of metal in guide are also explained with the help of transmission line.

Effect of the Type and Quantity of Refrigerant on The Performance of an Air-Cooling Machine

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Abstract

An air-cooling machine is used in a very deep underground mine to supply cool and dehumidified air to the workings. The performance of an air-cooling machine is expressed as rate of heat extracted (kW) and rate of moisture extraction (g/s). It depends upon many factors like evaporator design, design of expansion valve, condenser design, water flow rate in the condenser, mass flow rate of the air over the evaporator coils, type and quantity of the refrigerant. A study was carried out to study the effect of the type and quantity of the refrigerant on the performance of the air-cooling machine. The study revealed that the performance of the air-cooling machine was maximum, when the quantity corresponding to the refrigerant pressure of 3.2 kg/cm^2 at the evaporator outlet. It reduced when the quantity was varied from this value. The study further indicated that the performance of the air-cooling machine improved when refrigerant R-12 was replaced by R-22. However, the operation became unstable. It can therefore be concluded that the performance of the air-cooling machine is optimum for a certain quantity and type of the refrigerant.