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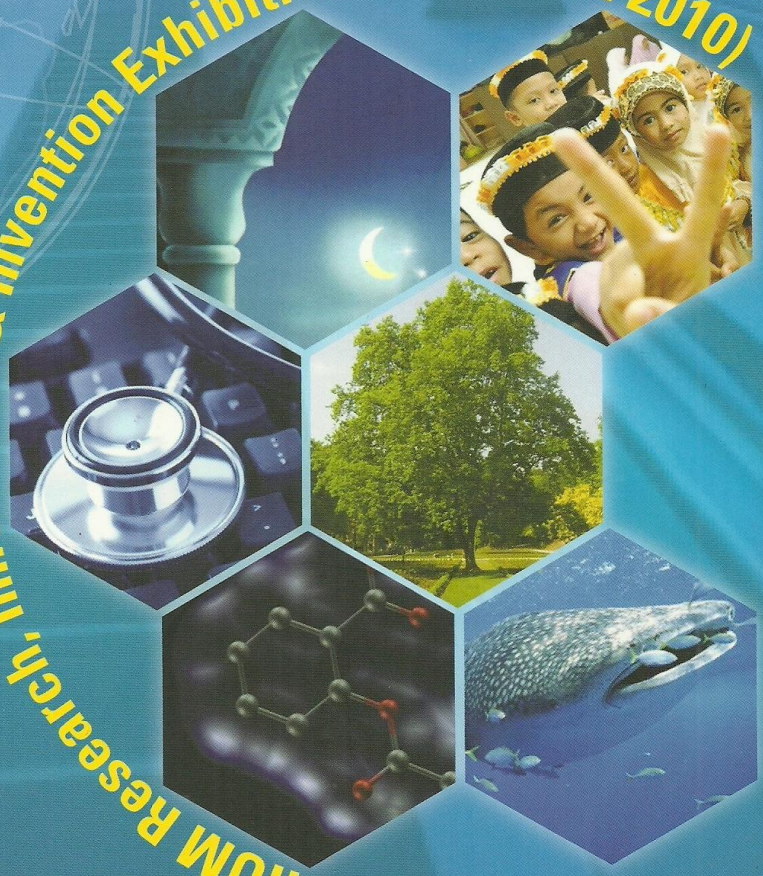

ENHANCING QUALITY RESEARCH & INNOVATION for SOCIETAL DEVELOPMENT

P-65 Modulated Phase of a Potts Model with Competing Interactions on a Cayley tree

Nasir Ganikhodjaev, *Temir Seyit, Hasan Akin*
Computational and Theoretical Sciences, Kulliyyah of Science
International Islamic University Malaysia

We study the phase diagram for Potts model on a Cayley tree with competing nearest-neighbor , prolonged next-nearest-neighbor and one-level next-nearest-neighbor interactions. The main result is that the introduction of one-level interactions has a strong effect on the phase diagram: Firstly it appears to shift the multicritical Lifshitz point to finite temperature, while it was stuck at zero temperature T for all systems with competing interactions, Ising or potts, studied on the Cayley tree previously; Secondary, as soon as the one-level interactions is nonzero, the paramagnetic phase found at high temperatures for zero one-level interaction disappears, while Ising model does not obtain such property.

P-66 Griffith-Kelly-Sherman Correlation Inequalities for Generalized Potts Model

Nasir Ganikhodjaev, *Fatimah Abdul Razak*
Computational and Theoretical Sciences, Kulliyyah of Science
International Islamic University Malaysia

Correlation inequalities play an important role in many areas of statistical mechanics. In addition to describing microscopic structure they also provide information about macroscopic properties: for ferromagnetic spin systems they give monotonicity of the critical temperature, inequalities for critical exponents. In the recent work of N.Macris it was shown that a correlation inequality of statistical mechanics can be applied to linear low-density parity-check codes. In this paper we prove Griffith-Kelly-Sherman (GKS) inequalities for the generalized Potts model. At present there are a lot papers and books where the authors proved correlation inequalities for different models. Formulated in this paper Griffith-Kelly-Sherman inequalities for Potts model are new and proof of these inequalities one can consider as new alternate combinatoric proof.

P-67 A New Method for the Analysis of Combined Operation of Electro-Osmotic Dewatering and Mechanical Expression

Mohammed Saedi Jami, *Masashi Iwata*
Biotechnology Engineering, Kulliyyah of Engineering
International Islamic University Malaysia

Electro-osmosis is especially effective in removing liquid from sludge of colloidal particles for which conventional mechanical dewatering is not very successful. This work presents results of experimental work carried out to study and analyze the combined operation of electro-osmotic dewatering (EOD) and mechanical expression (ME) by use of the Terzaghi-Voigt combined model for considering creep deformation of the material. The EOD-ME process combines the advantage of electro-osmosis and mechanical dewatering and consequently results in reduced void ratio compared to individual operation. The basic differential equation based on the model is solved analytically by assuming that both an electro-osmotic pressure gradient Epg and the modified consolidation coefficient Ce of the material are constant, resulting in the equation of solid compressive pressure in the material as a function of time and position. The results of dewatering experiments show that the electro-osmotic dewatering can be recognized as a kind of consolidation, since it accompanies an increase in solid compressive pressure in the material. The analytical equation also leads to the equation of the average consolidation ratio Uc, which is a measure of the progress of dewatering; this equation can describe well the empirical results under various conditions. The large water content of bentonite slurry can be reduced by electro-osmotic dewatering-mechanical expression (EOD-ME). The void ratio reduction and hence rate of dewatering is higher when electro-osmotic dewatering (EOD) is combined with mechanical expression (ME) than just a traditional

mechanical expression alone. Therefore, EOD-ME could potentially be an effective dewatering technique for sludge.

P-69 Efficient Method for the Purification of Coagulated Sewage Secondary Effluent

Mohammed Saedi Jami, *Than Ohn, Eiji Iritani*
Biotechnology Engineering, Kulliyyah of Engineering
International Islamic University Malaysia

Constant rate microfiltration experiments are conducted in purification of sewage secondary effluent pretreated with polyaluminum chloride (PAC). Monolithic ceramic membrane having a nominal pore size of 1.0 micro meter with 19 tubular channels is used as a filter medium. The system is capable of selecting the required mode of membrane cleaning, i.e., physical backwashing or chemically enhanced backwashing, based on the set value of the operating parameters. Flow resistance resulted from the formation of the filter cake is reduced by the physical backwashing, but in spite of this, the flow resistance increases gradually in a longer period of operation due to irreversible pore blocking. Hence chemically enhanced backwashing should be conducted occasionally. Sodium hypochlorite is used as cleaning agent and it is injected automatically when pore blocking reached to the preset level. The experimental results showed that the chemically enhanced backwashing is effective in restoring the increased portion of the flow resistance. The fully automatic system was found to be stable regardless of the variable influent quality and could be run at relatively higher flux of 3.0 m/d for a long period of time. The filtrate is free from pathogens and can be reused as reclaimed water for toilet flushing, car washing, etc. Furthermore, the results obtained under various operating conditions indicated that when process optimization is considered, there should be a trade off between the energy consumption and the amount of cleaning agent used per net filtrate volume.

P-72 The multistage homotopy-perturbation method: A powerful scheme for handling the Chaotic Lorenz system

Md. Sazzad Hossien Chowdhury
Science in Engineering, Kulliyyah of Engineering
International Islamic University Malaysia

In this paper, a new reliable algorithm based on an adaptation of the standard homotopy-perturbation method (HPM) is presented. The HPM is treated, as an algorithm in a sequence of intervals (ie time step) for finding accurate approximate solutions to the famous Lorenz system. Numerical comparisons between the multistage homotopy-perturbation method (MHPM) and the classical fourth-order Runge-Kutta (RK4) method reveal that the new technique is a promising tool for the nonlinear systems of ODEs.

P-73 Achirality Via Graphs

Mohammad Azram
Science in Engineering, Kulliyyah of Engineering
International Islamic University Malaysia

This article is devoted to establish relationship between knots and planar graphs. This relationship enables us to investigate the total numbers of regions and their relationship with corresponding crossings in a reduced alternating achiral knot. It has been shown that the numbers of regions in a reduced alternating achiral knot is always even and the number of crossing is always two less than the number of regions. Finally we were able to establish necessary conditions for achirality.