ABSTRACT

Industrial and experimental induction furnaces are used in the melting of various types of iron ingots, returned scraps and DRI sponge pellets to produce high purity cast-iron and steel heats. The lowest consumption of electrical energy determined for a continuous feeding operation is 0.3 KWH/Kg, for the production of cast-iron in a 1.5-ton industrial furnace, and 0.45 KWH/Kg for the production of steel in a 25-kG experimental furnace. The optimum feeding rate for lowest energy consumption is 12.5 grams per second for continuous feeding of DRI in a 25-Kg induction furnace. Similar measurements show that the optimum size of the DRI pellets is around 7 milimetres.

T CELL EPITOPES OF THE MAJOR FRACTION OF RYE GRASS LOLIUM PERENNE (LOI pI) DEFINED USING OVERLAPPING PEPTIDES IN VITRO AND IN VIVO. I. ISOALLERGEN CLONE 1A*

G. A. Bungy Poorfard
Y. Latchman
I. Roitt
J. Brostoff
Department of Immunology,
University College London Medical School.
S. Rodda
M. Geysen
Chiron Minotopes Pty. Ltd., Clayton, Victoria. Australia .

ABSTRACT

One hundred and fifteen overlapping synthetic peptides spanning the entire sequence of the isoallergen clone 1A of *Lol p* I from rye grass *Lolium perenne* were synthesized by the multi-pin technique. The peptides were overlapping 12mers, offset by two residues and overlapping by 10 residues. Sets of six adjacent overlapping peptides (except pool- 1,15,20) were pooled and were used *in vitro* and *in vivo* to map the T cell epitopes on *Lol p* I. Six atopics who were skin test and RAST positive to rye grass showed T cell responses to *L. perenne* extract (LPE) and its major fraction *(Lol p* 1). Five out of six showed T cell responses *in vitro* to peptide pool-17. While five non-atopics did not respond to any of the peptide pools. By testing the individual peptides of pool-17, we have located the T cell epitope on *Lol p* 1. Interestingly, when we tested pool-17, and its single peptides *in vivo* by intradermal skin testing we found in one patient a typical DTH after 24-48h to pool-17 and its peptides (peptides 3 and 4) which exactly matched the *in vitro* responses. By defining the T cell epitopes in this way a greater understanding of the allergic response to pollen will be obtained, and a more effective and less dangerous vaccine may be possible for treating patients with hay fever.

* *Published in Clin Exp Immunol. Vol. 94 PP 111-116 (1993).*

EFFICIENT METHOD OF USING HIGH- DENSITY DIGITAL RADIO IN PRE-ESTABLISHED ANALOG NETWORK*

M. Tabiani
Department of Electrical Engineering,
Sharif University of Technology
K. H. Manouchehri
Telecommunication Company of Iran

ABSTRACT

The major technical parameters of digital and analog radio systems have been analyzed such as transmission performance, modulation bandwidth, interference and fading. The last two parameters have been shown to be more important and therefore have been modeled and the results compared with suitable probability distributions which can be assumed.

* *Presented at the ASME International Conference, Signal and Data Systems, November 11-13, 1991, Djerba, Tunisia.*

GENESIS OF THE KAOLIN DEPOSIT OF KABUTAR-KUH, N.E. IRAN*

F. Golestaneh
M. Hakim
Department of Metallurgical Engineering,
Sharif University of Technology

ABSTRACT

This deposit is located about 50 Km southeast of the town of Gonabad and is originated by the hydrothermal alteration of jurassic volcanic rocks, with a compact to fine porphyritic texture constraint on a fractured zone with a 45° NESW to E-W striking and 60° SE to nearly vertical dip. Macroscopic investigations of cross-sections of the deposit reveal a gradual transition of the fresh volcanites on the top of the deposit to the strongly kaolinized rocks in the deeper areas. Microscopic, the fresh volcanites bear, besides feldspar phenocrysts, a large amount of pseudomorphs of chlorites as an alteration product of pyroxenes and amphiboles. Two cross sections of the altered zone show, by X-ray analysis, neogenic minerals: quartz, kaolinite, alunite and pyrophyllite. The quantitative amount of these minerals is in each sample different and contains, it appears, different mineral- paragenesis. Prospective sampling of the altered rocks of the minable region of the deposit showed two different types of raw materials. The first one (type 1) consists of a fibrous, undulating aggregate with a clear white colour. The second one (type 2) is a structureless, compact, homogeneous material of a greenish white colour. The Kabutar- Kuh kaolin deposit has mostly a hydrothermal origin. The silification, kaolinization, alunitization and pyrophyllization of the rocks are an evidence of this genesis. Besides, the altered regions are always controlled by fault zones and there is a gradual transition from fresh to completely altered rocks visible on the surface. Strongly silicating rock-parts (sintercap) over the kaolin, slaking-resistance of kaolin in water, its high density, its lack of natural plasticity and the presence of idiomorphic texture of Kaolinite crystals, are all significant for a hydrothermal origin.

* *Published in Erzmetall Vol. 45 No. 1, PP 39-48 (1992).*

ANALYTICAL STUDY OF DRAWING OF NON-BONDED TRIMETALLIC STRIPS*

A. Karimi Taheri
Department of Metallurgical Engineering,
Sharif University of Technology

ABSTRACT

The present study is concerned with an analytical solution of the process based on upper bound technique. A kinematically admissible plane strain velocity field is proposed which takes into account the die geometry, friction conditions, relative motion between the components, strength and volume fraction of the component materials, redundant work and strain hardening. The analysis is considered to be the first solution of the process capable of predicting the final thicknesses of the components in drawn trimetallic strips. This is performed by minimizing the drawing power by computer analysis. Experimental results for drawing of aluminium, copper and aluminium trimetallic strips show good agreement with theoretical results.

* *To be published in International Journal of Machine Tools and Manufacture.*

DIRECT REDUCED IRON: AN ADVANTAGEOUS CHARGE MATERIAL FOR INDUCTION FURNACES**

K. Sadrnezhaad
Department of Metallurgical Engineering,
Sharif University of Technology

** *To be Published in Journal of Engineering I. R. Iran.*

SOME NEW FAMILIES OF SIMPLE t- DESIGNS*

E. S. Mahmoodian
M. Shirdarreh
Department of Mathematical Sciences,
Sharif University of Technology

ABSTRACT

Applying some methods of construction on existing t-designs, some infinite families of new simple designs were obtained. A table which contains many new simple designs in small cases is given. The main method, which is called the union method, involves taking the union of every two blocks in a given design. This method is also combined with some other well known ones. Some of the new obtained designs are the following. If there exists a Hadamard matrix of order $4m$, then there exists a simple 2-($4m$-1 , m, $m(m$-1)/2) design, a 2-(4 m, m, (2m-1) (m-1)) design, a simple 3-(4m, 2m-1, (m-1) (2m-3)) design, and a simple 3- (4m, 2m-2, (2m-3) (m-2)*(m-1))* design. Finally if q is a prime power, then there exists a simple 2- (q^2 (q+2)), $q(2q+1)$, $q(q+1)(2q+1)(2q-1)/2$) design. We show that the number of non- isomorphic simple 2- (15, 4, 6) designs is at least 10.

EXISTENCE OF PERIODIC SOLUTION FOR A CLASS OF NONLINEAR SECOND ORDER ODE**

B. Mehri
Y. Tabesh
Department of Mathematical Sciences,
Sharif University of Technology

ABSTRACT

We consider the non-linear second order differential equation

$$x'' + g(x)x' + f(t, x) = e(t)$$

Where g (x) is continuous, f(t,x), e(t) are continuous and periodic with respect to t of period w. We use the Leray-Schauder principal in a form suggested by G. Güssefeldt [1]. We prove that the above equation possesses at least one, non-trivial periodic solution of period w.

NUMBERS OF COMMON BLOCKS IN MENDELSOHN AND DIRECTED TRIPLE SYSTEMS WITH REPEATED ELEMENTS*

E. S. Mahmoodian
Department of Mathematical Sciences,
Sharif University of Technology
Elizabeth J. Billington
Center for Combinatorics, Department of Mathematics,
The University of Queensland

ABSTRACT

An ordered to triple system with repeats, of order v, is a pair (S, T) where S is a v-set and T is a collection of ordered triples of elements of S of type (a, b, c) where a, b, c need not all be distinct, and so that every ordered pair of not-necessarily-distinct elements of S belongs to exactly one ordered triple in T. If each triple (a, b, c) is said to contain the ordered pairs (a, b), (b, c), (c, a), then the ordered triple system with repeats is a Mendelsohn triple system with repeats or DTS-R, while if it contains pairs (a, b), (b, c), (a, c), it is a directed triple system with repeats or DTS-R. It is known that these systems exist if and only if $v \equiv 0 \pmod 3$. Let $I_M(v)$, respectively $I_D(v)$, denote the set of non-negative integers k for which there exist two MTS-R, respectively two DTS-R, based on a common v-set with precisely k common triples. In this paper we determine $I_M(v)$ and $I_D(v)$ for all admissible v.

* *Published in Australasian Journal of Combinatorics, Vol. 5, PP 159-168 (1992).*

** *To be Published in the Journal of Science, I. R. Iran.*

* *Submitted to Iranian Mathematical Bulletin.*

ABSTRACTS OF PAPERS PRESENTED AT INTERNATIONAL CONFERENCES

The abstracts of papers published in this magazine pertain to research projects conducted all over I.R. Iran, including those papers which have been printed previously in reputable scientific publications, and are not limited to the Sharif University of Technology. The Editor would be happy to include abstracts, in future editions, of all scientific papers presented by researchers throughout the country, with a view to keeping the academia and professionals informed about research activities carried out by Iranian scientists.

THE STRUCTURE OF SHOCK WAVES IN A MODEL OF PLASMA*

M. Hesaaraki
Department of Mathematical Sciences,
Sharif University of Technology

ABSTRACT

The question of the existence of structure of MFD shock waves, in the case of rectilinear motion, for purely transverse magnetic fields in a model of plasma, is described by Germain; and a proof of existence for the case of neglecting viscosity and heat conduction are given.

The mathematical question is stated in terms of a four-dimensional system of ordinary differential equations which depends on four viscosity parameters. These equations admit two rest points, independent of the viscosity parameters. The problem considered in this article is to show that for all values of the viscosities, there is an orbit running from one rest point to the other. Moreover, the shock is stable or has the usual type of profile.

In order to solve the above problem, we show that our system is gradientlike. This result enables us to use the Conley theory and solve the problem. Moreover, some limiting cases for singular viscosities are investigated; in particular, we show how the general results in the classical one fluid M.H.D. theory are obtained when "the plasma viscosity" tends to zero.

* *To be published in Journal de Mathematiques Pures et Appliquees.*