SPHERE PACKINGS –

FROM KEPLER'S TIME UNTIL THE PRESENT

by Martin Henk (p. 3)

Although sphere packings belong to most classical, well-known and challenging problems in geometry, our knowledge about optimal sphere packings is still rather limited. In recent years, however, computer-aided investigations have led to some spectacular break throughs, maybe even the four centuries old Kepler conjecture has been solved. The purpose of this note is to highlight the exciting and sometimes checkered history of sphere packings, to present new developments and modern branches and to point out relations to other sciences.

FUNDAMENTALS OF FRICTION AND WEAR IN TECHNICAL APPLICATIONS

by Ludger Deters (p. 16)

The economic losses due to friction and wear in Germany amount to more than 7.5 billion EUR p.a. This indicates the importance of tribology, which includes the fields of friction, wear and lubrication, for the conservation of energy and materials. Any proper analysis and solution of tribological problems requires the consideration of numerous parameters and influencing factors. Through the application of the methods of systems analysis, it is possible to compile and to classify the main problem-relevant tribological parameters. For this, the functional technical purpose of the tribo-system, the operating variables, the structure of the tribo-system and the tribological loss-characteristics, which are marked by changes of the tribo-system structure (e.g. degradation of the lubricant, changes in contact topography and surface composition, changes of the wear mechanisms under the action of the operating variables, changes in the lubrication mode etc.) and by changes of the energy and material losses, have to be considered.
Friction and wear losses depends on the operating variables, such as the type of relative motion between the tribo-elements and its behaviour on time, load, velocity, temperature, operating duration etc., and the structure of the tribo-system, consisting of the involved elements, the relevant properties of the elements and the interactions between the elements. Changes of one of the influencing factors can lead to a change of friction and wear. That means that friction and wear are not material or geometrical related properties of one of the tribo-elements, as often assumed.

CONFLICT STRUCTURES AND VALUE CREATION

A NEGOTIATION ANALYTIC PERSPECTIVE

by Matthias Raith (p. 8)

Negotiation always involves distribution – distribution of benefits or costs. However, distribution is only possible, because negotiation implies the joint creation of value, which one party alone could not achieve. The main insight of negotiation analysis is that synergy in venture creation arises from differences rather than similarities between interacting parties. Parties are viewed as roles that are played by the actors in a negotiation. The characterization of the roles is part of the problem structure. The distinction between the problem and the player dimension of a negotiation enables one to quantify conflict structures and develop procedures to use the inherent value productively.

THE USE OF SOLAR ENERGY TECHNOLOGY

AN ENVIRONMENTAL PSYCHOLOGICAL TOPIC

by Petra Schweizer-Ries (p. 27)

Environmental psychology is concerned with different environments, like natural, social and cultural environments, including the constructed ones as well as technical instruments, which are influencing and are influenced by people. On the use of solar energy technology, the article describes the application of the social design theory, derived from architectural psychology on the one hand and on the other hand from the socio-technical system design theory, which is originated in organisational psychology. Using a phase model, two examples are presented, in which social investigations and interventions are described briefly. The five different phases are: concept, contact, preparation, implementation and follow up. Social issues are important in every single phase, but nevertheless they are often ignored. Participation and action research can be very helpful: Firstly in order to further elaborate the human factor in rural energy supply and secondly in order to spread the knowledge into communities and social as well as engineering sciences.

CLINICAL AND PATHOPHYSIOLOGICAL ASPECTS OF RENAL VASCULITIDES

by Eike Wrenger, Ute Bank, Klaus Hinrich Neumann (p. 35)

Primary systemic vasculitides (inflammation of blood vessels) are disorders of the immune system. Small vessel vasculitides represent a subgroup of these complex disorders. Since the renal glomerular capillary walls form the renal filtration barrier, involvement of these small renal vessels can severely damage the excretory function of the kidneys. Loss of function of inflicted glomeruli rapidly can lead to renal insufficiency and consequent dependence on renal replacement therapy (dialysis, renal transplantation). Also, involvement of other organ systems, especially the respiratory system, can have deleterious consequences for the patient. Therefore, rapid diagnosis is of extreme importance for the survival of the patients and the prevention of end stage renal failure. In this paper we describe various forms of vasculitis with renal involvement and the present approach to diagnosis and therapy. In addition, various aspects of the pathophysiology of vasculitis, which have been the focus of research of our group during the past years, are discussed.

PRIZES IN MATHEMATICS

by Hans-Christoph Grunau (p. 45)

On 24th June 2000, the Clay Mathematics Institute named seven Millenium Prize Problems during its Millenium Meeting at the College de France at Paris.
A prize fund of 1 Million USD is designated for the solution of each of these problems. At present these are arguably the most prestigeous prizes to be awarded to mathematicians. On the one hand, this is due to the enormous reputation of the scientific committee which has selected the prize problems. On the other hand the scientific importance and difficulty of all prize problems is obvious to all professional mathematicians. It is expected that any serious attempt to solve the problems will give rise to significant progress in mathematics, independent of whether the attempt will be successful or not.
In the present survey, four of the Prize Problems are explained in some detail.