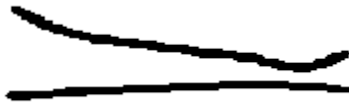


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Hydrodynamics

1. LOAD-CARRYING CAPACITY OF THE HD JOURNAL BEARING WITH CIRCUMFERENTIAL SURFACE IRREGULARITIES

pp. 1-7

by Dominic ANTĂLUCĂ¹, Dumitru OLARU¹ & Daniel NELIAS²

¹ Technical University "Gh. Asachi" of Iassy, Romania

² INSA Lyon, LaMcoS, France

Abstract: The performance of a journal bearing, like the load-carrying capacity, lubricant film pressure, depend on the characteristics of the lubricant, the imposed geometry, shaft eccentricity and also on the working conditions. For this study a computer code has been developed by authors in order to study the influence of the imposed circumferential waviness of the finite length journal bearing surface, on the film pressure, load-carrying capacity, attitude angle, and eccentricity ratio. The numerical results obtained by this approach were validated with numerical results obtained by Rasheed [13].

2. ANALYTICAL AND NUMERICAL MODELING OF THE LUBRICATION OF A TEXTURED CELL

pp. 8 -17

by Victor MARIAN & Traian CICONE

University Politehnica of Bucharest, Romania

Abstract: Lubrication of textured surfaces is an emerging field with great potential in modern tribology. The present article presents a numerical model of two types of dimples: square dimples which are obtained by chemical erosion and spherical dimples, which are obtained by laser texturing. A simplified solution is obtained analytically based on the linearization of the pressure distribution. The exact solution is obtained numerically based on the finite difference method. The model is considered to be isothermal and the liquid incompressible. A simplified cavitation model is included in the numerical method. Finally the pressure distribution obtained for the two types of dimples are compared for different values of dimple height and texture density. The results obtained show that the square dimples produce a higher load carrying capacity than the spherical dimples.

3. A THERMOHYDRODYNAMIC BEHAVIOR STUDY OF A VISCOUS TRANSMISSION

pp. 18 -22

by Adrian PREDESCU & Tiberiu LAURIAN

University Politehnica of Bucharest, Romania

Abstract: It is well known that viscous transmissions are widely utilized in automotive industry, for both inter-axle differentials and axle blocking devices. The improvement of the technical performances of this type of transmissions requires new studies. The purpose of this paper is to assess this problem using a CFD (Computational Fluid Dynamics) code in order to establish the working parameters for this type of transmission and compare them with experimental results. Generally, a viscous transmission comprises a coupling. The coupling is formed from a case and a number of friction disks, alternatively connected to the shaft and the case. The analyzed model has simple disks (with no holes or slits).

4. A COMPARATIVE STUDY OF THE VISCOUS COUPLINGS REGARDING THEIR BASIC PARAMETERS

pp. 23-27

by Adrian PREDESCU & Tiberiu LAURIAN

University Politehnica of Bucharest, Romania

Abstract: This article intends to analyze the thermohydrodynamic regime for distinctive geometries of the active elements of a viscous coupling. The comparative study is performed with the aid of a CFD code. This method allows the establishment of some important running parameters of the viscous coupling such as the loading capacity, the viscosity of the operating fluid and the constructive dimensions of the transmission.

5. ANALYTICAL MODEL FOR PRESSURE AND THERMAL INDUCED DEFORMATIONS OF AN ELASTIC PARALLEL SURFACE SLIDER

pp. 28-41

by Andrei MINCULESCU¹, Traian CICONE² & Mircea D. PASCOVICI²

¹Honeywell-Garrett - Romania

²Polytechnic University of Bucharest - Romania, Department of Machine Elements and Tribology

Abstract: The main goal of the present paper is to analyze theoretically an elastic slider, with nominal flat and parallel surfaces. The proposed 1-D TEHD model allows to calculate pad deformations produced by pressure distribution and by temperature gradient across the pad. Isoviscous Reynolds equation for infinite width parabolic gap is solved for pressure distribution. Thermo-elastic deformations are calculated for constant temperature gradient across the pad. The mean film temperature is obtained

from a bulk energy balance. The results are compared with similar results, obtained using a non-isothermal 1D-TEHD previously published by the same authors.

6. A SOFTWARE TOOL FOR THERMO-ELASTO-HYDRODYNAMIC ANALYSIS OF THRUST BEARINGS

pp. 42-53

by **Andrei MINCULESCU¹, Traian CICONE² & Michel FILLON³**

¹Honeywell-Garrett - Romania

²Polytechnic University of Bucharest - Romania, Department of Machine Elements and Tribology

³Laboratory of Solid Mechanics, UMR CNRS 6610, University of Poitiers, France

Abstract: *Pressure and temperature induced deformations, although small, can be at the origin of fluid film forming, in sliders with nominal flat and parallel surfaces. A realistic analysis of such configurations must be done using complex, thermo-elasto-hydrodynamic (TEHD) models that cannot be solved using a single commercial software tool. Therefore, specific computer codes must be developed. The present paper presents a software tool developed for TEHD analysis of elastic sliders typically used in thrust bearings. This Thrust Bearing Analysis (TBA) software couples two solvers: a finite element (FE) module to solve for pad deflections and a flow module, for pressure and temperature distribution in the film as well as heat transfer in the pad. The latter consists of an iterative solution of decoupled Reynolds and energy equations, based on a first order finite differences scheme (FD).*

7. ETANCHEITES FRONTALES HYDRODYNAMIQUES

pp. 54-60

by **Nicolae POPA**

Université de Pitesti, Romania

Abstract: *La définition et réalisation de la précision géométrique à l'étanchéité primaire cause des grands problèmes technologiques. Dans le contact hertzien d'une bille sur un plan d'exemplaire, l'épaisseur du film peut être très petite ($< 1 \mu\text{m}$), mais la géométrie est connue : une sphère – un plan. Au contraire, dans les contacts de surfaces normales (palier, guidage etc), la précision de positionnement est satisfaite même dans un ordre de dimension (1/1000 ... 1/10 mm) de l'épaisseur du film. Mais pour un contact de surfaces de type étanchéité primaire, l'épaisseur du film est de l'ordre 1-2 μm . Elle est de même ordre de dimension que la précision géométrique du plan, liée des imperfections de forme et positionnement relative des deux surfaces. Cet étude met en évidence la complexité du contact HD aux étanchéités frontales et permet voir que certains positionnements (qui probablement existent dans les montages industrielles) créent une portance HD suffisante afin de permettre un fonctionnement satisfaisant.*

Lubricant Rheology

8. EXPERIMENTAL INVESTIGATIONS CONCERNING STRUCTURAL FLOW UNITS IN MOLECULAR SUBSTANCES

pp. 61-66

by Vlad Flaviu ZEGREAN & Emanuel DIACONESCU

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *One of major lubrication problems is determination of flow parameters of the lubricant. Some theories derive the flow parameters by means of structural flow units, which could be molecules or clusters, depending on the liquid structure. Different results for the lubricant flow parameters are result when using these two models. This paper proposes an experimental method to determine the type of structural flow units in a solid state paraffin, by using the atomic force microscopy.*

9. RHEOLOGICAL BEHAVIOR OF PARAFFIN AT AMBIENT PRESSURE

pp. 67-72

by Oana MIRON ONCIUL & Emanuel DIACONESCU

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *This paper shows that rheological properties of molecular liquids can be determined experimentally on molecular solids. A shear head is developed to measure the viscosity of solid paraffin. The basic idea consists in transversal shear of a cylindrical paraffin bar under controlled temperature and atmospheric pressure. Experimental results indicate that this idea is feasible.*

10. THE EFFECT OF PRESSURE UPON RHEOLOGICAL BEHAVIOR OF PARAFFIN

pp. 73-77

by Oana MIRON ONCIUL & Emanuel DIACONESCU

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *This paper describes a simple method to measure the viscosity solid paraffin by shear of a solid cylindrical bar. Viscosity tests were performed in quasi-static shear at four temperature levels, namely - 2°C, 2 °C, 5 °C and 8 °C, and various pressures in the range (0...7)MPa. Experimental results indicate that this idea is feasible.*

11. SOME ASPECTS CONCERNING DRY AND LUBRICATED OBLIQUE IMPACT

pp. 78-83

by Ilie MUSCA

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *The paper presents a comparative analysis of inclined impact tests results in dry and lubricated conditions obtained on an original test rig built to evaluate the tangential effects that occur in the oblique impact between a free falling ball and other surface. This evaluation is based on kinematics parameters evaluation before and after impact. Mean oil shear stress and global sliding friction coefficient values are presented. A good similarity of dry and lubricated contact behaviour can be observed. This similarity reveals a solid like behaviour of lubricant during impact.*

Contact Mechanics

12. THREE-DIMENSIONAL ELASTIC-PLASTIC ROLLING AND SLIDING CONTACT ANALYSIS

pp. 84-95

by Gabriel POPESCU

Technical University “Gh. Asachi” Iasi, Romania

Abstract: *A semi-analytical three-dimensional elastic-plastic over-rolling solution is used to evaluate the plastic strains and ratchetting phenomena. Central to this plastic contact formulation is the incremental approach to deal with non-linear material behavior. The Prandtl-Reuss constitutive equations in conjunction with Huber-Mises-Hencky yield criterion and Ramberg-Osgood strain-hardening relationships are applied to describe the plastic behavior of common hardened bearing steel. The model was extended to include the tangential force in the rolling direction, assumed to be proportional to the hertzian contact pressure. Comparisons of three-dimensional pure rolling and rolling/sliding contact results were provided to elucidate the differences in residual stresses and ratchetting behaviour in case of kinematic and work-hardening materials.*

13. FFT ANALYSIS OF ELASTIC NON-HERTZIAN CONTACTS – EFFECT OF ROUNDING RADIUS UPON PRESSURE DISTRIBUTION AND STRESS STATE

pp. 96-107

by Sergiu SPÎNU, Dorin GRĂDINARU & Marius MARCHITAN

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *A fast and accurate algorithm, based on the discrete convolution fast Fourier transform theorem, was proposed. Pressure distribution and stress state for different concentrated and conforming contacts were analyzed. In cases of conical indenter with rounded tip and flat-ended punch with radiused corner, numerical investigations were validated by analytical results. Geometries for square pyramid and for square and regular hexagonal flat-ended punch were advanced. Effect of varying the rounding radius upon pressure distribution and stress state was considered.*

14. FFT INVESTIGATIONS OF PRESSURE DISTRIBUTION IN AN ELASTOPLASTIC CONTACT PROBLEM

pp. 108-115

by Sergiu SPÎNU & Marius MARCHITAN

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *A fast and accurate CGM – DCFFT numerical method for computation of elasto-plastic pressure distribution, under the simplifying assumptions of the incremental theory of plasticity, is advanced. The residual part of the displacement being neglected, the elasto – plastic contact problem reduces to the elastic case, with the only supplementary assumption of an upper limit of pressure on the contact area, related to the yield stress of the softer material. Numerical results are presented, for different Hertz and non-Hertz geometries, while the behavior of the material is assumed elastic-perfect plastic and elastic with linear hardening.*

15. CONSIDERATIONS UPON TANGENTIAL INTERACTION ARISING WHEN A STRAIGHT CIRCULAR RIGID CYLINDER SLIDES FRONTALLY OVER AND AN ELASTIC HALF-SPACE

pp. 116-123

by E. N. Diaconescu and M. L. Glovnea

“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

Abstract: *The mechanism of surface interaction in sliding is based either on constant friction coefficient or on constant friction shear stress. This paper investigates the situation in the case of a straight circular rigid cylinder having the front flat surface sliding against an elastic half-space, by calculating half-space*

surface deformations in both cases. It is found that the deformed surface of the half-space does not comply with the flat front surface of the punch in the case of a constant friction coefficient, whereas a perfect agreement arises when a constant friction shear stress is assumed. This suggests that a constant shear stress governs the tangential interaction in conformal dry contacts.

16. STRESS STATE IN CERRUTI'S PLANE PROBLEM FOR AN ELASTIC HALF-PLANE WITH A CIRCULAR HOLE

pp. 124-133

by Stelian ALACI¹, Emanuel DIACONESCU¹ & Cristinel MARES²

¹ "Stefan cel Mare" University of Suceava - Romania, Department of Applied Mechanics

² Brunel University Uxbridge, United Kingdom

Abstract: *The paper extends a series of researches upon stress state and concentrator effect of circular holes from an elastic half-plane under different tensions. Some theoretical results of the authors are surveyed. Photo-elastic experimental tests are carried out to validate the theoretical results.*

17. PRELIMINARY EXPERIMENTAL INVESTIGATIONS UPON JUNCTION GROWTH UNDER TANGENTIAL LOADING

pp. 134-139

by Cornel SUCIU & Vasile COMORITAN

"Stefan cel Mare" University of Suceava - Romania, Department of Applied Mechanics

Abstract: *When the contact between two bodies is under a normal load, the contact area is a single circular region. If a tangential loading is applied, the size of the contact area increases considerably before macroscopic sliding takes place. This phenomenon is known as "junction growth". As the hypothesis of junction growth has not yet been experimentally verified for harder materials, as steel and sapphire are, the present paper makes an attempt to verify this phenomenon, by using visualization and measurement of contact area by reflectivity.*

Friction and Wear

18. SURFACE HEATING IN BALL BEARINGS CONTACTS

pp. 134-139

by Carmen BUJOREANU¹, Spiridon CRETU¹ & Daniel Nèlias²

¹Technical University "Gh. Asachi" of Iasi, Romania

²INSA Lyon, France

Abstract: *When the contact between two bodies is under a normal load, the contact area is a single circular region. If a tangential loading is applied, the size of the contact area increases considerably before macroscopic sliding takes place. This phenomenon is known as "junction growth". As the hypothesis of junction growth has not yet been experimentally verified for harder materials, as steel and sapphire are, the present paper makes an attempt to verify this phenomenon, by using visualization and measurement of contact area by reflectivity.*

19. COMPORTEMENT TRIBOLOGIQUE D'UNE SURFACE DE POLYCARBONATE TEXTURÉE PAR FAISCEAU LASER

pp. 146-152

by Adelina HAN¹, Gianni PILLON², Alexandru NICHICI¹ & Bernard VANNES³

¹Université « Politehnica » Timisoara, Faculté de Mécanique, Roumanie

²Université de Bourgogne, Laboratoire LTm - EA 2976, France

³Ecole Centrale de Lyon, Laboratoire LTDS – UMR 5513, France

Abstract: *The paper presents a relatively new solution of improving the tribological behavior of the steel-polycarbonate couple, by means of material removal. This solution consists of realizing a pattern of parallel grooves on the polycarbonate surface with a laser beam.*

20. ROLLING FRICTION IN A MICRO TRIBOSYSTEM

pp. 153-159

by Dumitru OLARU¹, Gheorghe PRISACARU¹ & Peter LORENZ²

¹Technical University "Gh. Asachi" of Iasi, Romania

²Hochschule fur Technik und Wirtschaft des Saarlandes HTW, Germany,

Abstract: *The authors developed a theoretical model and an experimental procedure to evaluate the rolling friction coefficient in a micro rolling tribosystem. The proposed procedure is based on integration of the free oscillations equations of a micro ball on a spherical surface. Based on the number and amplitude of the ball oscillations experimentally determined, was evaluated the rolling friction coefficient. Was evidenced also, the influence of the atmospheric condensed water on the rolling friction coefficient at the level of micro rolling tribosystems.*

21. ROLE OF THIRD BODIES IN FRICTION AND WEAR OF Cu-GRAPHITE COMPOSITES

pp. 160-164

by Rong FU, Baoyun SONG, Fei GAO & Qingjun YU

Department of Material Science and Engineering, Dalian Jiaotong University, Dalian, China

Abstract: *Copper-graphite composites were fabricated through powder metallurgy technique. The performance of the composites in friction and wear was tested on a friction tester. The formation and development of third bodies during the friction were observed step by step. The results demonstrate that the morphological features of the third bodies affect the friction coefficient and wear rate. In pure copper, the third bodies are strongly adhesive, resulting in drastic oscillation in friction coefficient. As the content of graphite in the composite increases, the third bodies made of graphite become predominant. The presence of graphite prevents the adhesion of the materials, and hence lowers and stabilizes the friction coefficient and wear rate. Microstructural observations of the composite friction surfaces reveal that the third bodies undergo a particle formation and accumulation process and exist as particulates and compact zones. The compact zone is also the result of nucleation and growth process.*

22. EFFECT OF FRICTION MODES ON FRICTION PROPERTIES OF Cu-SiO₂ COMPOSITES

pp. 165-170

by Fei GAO¹, Rong FU¹, Baoyun SONG¹ & Yves BERTHIER²

¹Department of Material Science and Engineering, Dalian Jiaotong University, Dalian, China

²Laboratoire de Mécanique des Contacts et des Solides Institut National des Sciences Appliquées de Lyon, Lyon, France

Abstract: *The effects of content and granularity of SiO₂ on friction and wear performance of copper matrix composites depend on friction conditions. Cu-SiO₂ composites are prepared through powder metallurgy for this study. The effects of SiO₂ content, SiO₂ granularity and different friction modes on the friction performance of the materials were studied with friction speed of 1.6 ~ 47.1 m/s. The results show that the friction coefficient and wear rate increase with increasing SiO₂ content, the SiO₂ granularity has negligible effect, and the friction mode affects the friction and wear considerably as a result of its influence on the configuration of the third bodies. The third bodies formed in high speed friction are continuous and compact, leading to reduced wear rate and decreased fluctuation in the friction coefficient with the change in friction speed.*

23. ASPECTS OF ANALYTICAL EVALUATION OF INTERFACIAL FRICTION

pp. 171-179

by Luminița Irimescu¹, Florina Ciornei¹, Emanuel Diaconescu¹ & Yves Berthier²

¹“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

²Laboratoire de Mécanique des Contacts et des Solides Institut National des Sciences Appliquées de Lyon, Lyon, France

Abstract: *Afin d'évaluer le frottement à l'interface, on a étudié comparativement les contacts sphère – plan et galet – plan, pour la même distribution des contraintes de contact. Les essais expérimentaux ont donné une bonne validation qualitative du modèle analytique proposée pour le microglissement à l'interface d'un contact élastique en roulement.*

Biotribology

24. LUBRICATION OF RED BLOOD CELLS IN NARROW CAPILLARIES. A HEURISTIC APPROACH

pp. 180-189

by Mircea PASCOVICI

Polytechnic University of Bucharest, Romania

Abstract: *An elastohydrodynamic (EHD) approach of the lubrication of red cells moving in narrow capillaries, taking into consideration the effect of highly compressible porous endothelial glycocalyx is presented. The paper proposes a complex model, using a somehow heuristic approach, leading to analytical solutions, for the lubricant film thickness and for the correlation between the red cells speed and the pressure drop, for different capillary diameters. The numerical results are in good agreement with the experimental and theoretical data from literature.*

25. THE DETECTION OF INSERTION ENDPOINT AND STABILITY ASSESSMENT OF CEMENTLESS HIP STEMS BY VIBRATION ANALYSIS: A PER-OPERATIVE PILOT STUDY

pp. 190-197

by Leonard PASTRAV, Siegfried JAECQUES, Michiel MULIER & Georges VAN DER PERRE

K.U.Leuven, Belgium

Abstract: *The stability of an implant in bone is directly related to the quality of the contact at the bone-implant interface. The assessment of the primary stability of cementless implants still remains a subjective factor in total hip replacement (THR) and, as a consequence, the excessive press-fitting of a THR component can be the cause of intra-operative fractures. Objective information about the stability of implant-bone structures can be obtained using methods based on vibration analysis. After extensive in vitro studies a per-operative protocol was designed to detect the insertion endpoint and/or to assess the stability of custom made hip prostheses. The frequency response function evolution during the hip stem insertion in the femur was studied. The experiments were performed in per-operative conditions.*

26. A METHOD BASED ON VIBRATION ANALYSIS TO ASSESS THE STABILITY OF PARTIALLY CEMENTED HIP STEMS: A CLINICAL STUDY

pp.198-205

by Leonard PASTRAV, Siegfried JAECQUES, Michiel MULIER & Georges VAN DER PERRE

K.U.Leuven, Belgium

Abstract: *A change of the boundary conditions of an implant can be indicated by an alteration of the vibrational behaviour of the implant-bone structure. In the case of partially cemented hip stems the contact conditions vary between different situations: uncemented stem and cemented stem with the cement in different polymerisation stages. A pilot study was set up to study the feasibility of monitoring the curing of poly-methyl methacrylate (PMMA) bone cement in situ by vibration analysis during a total hip replacement (THR) procedure. The frequency response function (FRF) evolution reflected the changes at the bone-implant interface due to the presence of the cement.*

27. GEOMETRICAL CONSIDERATIONS RELEVANT TO THE INITIAL STABILITY OF HIP PROSTHESES.

pp. 206-215

by Luc LABEY, Siegfried JAECQUES, Cezar PASTRAV, Frederik GELAUDE, Michiel MULIER & Georges VAN DER PERRE

K.U.Leuven, Belgium

Abstract: *The stability of hip prostheses is one of the determining factors for their long-term performance. Certainly in the case of cementless implants, where the prosthesis stem is only fixed to the bone by a so-called interference fit, sufficient stability is hard to achieve. Peroperatively manufactured custom-made stems, which give optimal fit and fill of the intramedullary canal, might resist the daily loads on the hip better than standard stems. However, a large variety of stem geometries can be expected with this technique. We used the principle of virtual work and a straightforward mechanical model to obtain algebraic formulas to estimate the role of the geometry of custom-made hip stems in their initial stability. The initial stability of 10 custom-made hip stems was estimated and compared with the stability of the Charnley and 3M Capital hips.*

28. A WEAR MODEL FOR UHMWPE WITH APPLICATION ON THE KNEE PROSTHESES

pp. 216-223

by **Andrei TUDOR, Alina CHESNOIU & Georgiana BOSOI**

Polytechnic University of Bucharest, Romania

Abstract: Tribological phenomena in the knee prostheses contact defined the durability of knee prostheses. The dimensionless Von Misses parameter is used to limit the elastic deformation for a hertzian contact of the femoral metallic component with the tibia and the patellar polyethylene components. Dimensionless contact pressure is obtained by to overlap elastic normal and friction stresses. The mechanical wear model is defined by the fatigue strength of polyethylene material at the walking, parameters. The effects of body weight, angle of bending and rotation of femoral component to relatively of are analyzed

29. THE WEAR EFFECT ON THE STRESS FIELD OF UHMWPE ACETABULAR CUP

pp. 224-231

by **Andrei TUDOR¹, Tiberiu LAURIAN¹, Felix PARVU¹ & Mihai POPESCU²**

¹Polytechnic University of Bucharest, Romania

²Department of Orthopaedics and Trauma, University of Medicine "Carol Davila", Bucharest, Romania

Abstract: The longevity of total hip arthroplasties is significantly reduced by the wear of joint surfaces. Wear is proportional to contact pressure and sliding distance that is generated by the patient's daily activity. While the sliding distance can be estimated using the variation of angles describing the hip kinematics, determining the pressure distribution prove to be difficult especially because the Hertz contact hypotheses are not valid in the case of ball-in-socket joints. With the aid numerical method it was possible to study the behavior of hip joint prostheses having different radial clearances which is caused by wear of acetabular cup.

30. ASPECTS REGARDING DENTAL CONTACTS BIOTRIBOLOGY

pp. 232-241

by **Gheorghe FRUNZA¹, Mihai Catalin FRUNZA², Florina Ciornei¹ & Valentin NAHIRNEAC¹**

¹"Stefan cel Mare" University of Suceava - Romania, Department of Applied Mechanics

²Faculty of Dental Medicine Graduate, University of Medicine and Pharmacy, Bucharest, Romania

Abstract: The present paper approaches the tribological aspects of the oral cavity, emphasizing the stress state in dental biocontacts. The state of stresses influences the mechanism of propagation of the

biomechanical fatigue microcracks, which manifests itself finally on a very small area from the teeth interface. The cracks can be nucleated on the surface, on the subsurface or on both, depending on the quality of the dental materials, the restorations accuracy, the physiological or pathological conditions and also on the initial stresses and the interface. The groups of stresses which act upon a nucleate crack from the dental biocontact surface are contact, interface and initial stresses. If in the natural biocontacts the tribological processes are in conventional conditions under the control of the biosystem in which are integrated, in the biocontacts between a natural material and an artificial one there should be a different approach, which constitutes the subject of this paper.

31. ANALYSIS OF A BIOMECHANICAL FACTOR AFFECTING TYPE I ENDOLEAKS IN A STENTED ABDOMINAL AORTIC ANEURYSM

pp. 242-253

by Anne AMBLARD, H el ene WALTER-LE BERRE, Benyeka BOU-SA ID & Michel BRUNET

Laboratoire de M ecanique des Contacts et des Solides, INSA CNRS/5514, Villeurbanne, France

Abstract: *In order to improve endovascular graft used for the treatment of abdominal aortic aneurysm, we develop a methodology to analyse phenomena of type I endoleaks in a non invasive stented abdominal aorta. On the one hand, this study provides an evaluation of the parietal stresses generated by the blood flow. As blood is a shear-thinning, non-Newtonian fluid, we use the Phan-Thien and Tanner model, resulting from the polymer rheology. On the other hand, we develop an axisymmetric finite-element model of the complete system. Plast2, an explicit dynamic finite element code, is used to simulate the behavior of the system subjected to hydrostatic pressure and to the stresses generated by the blood flow. As the response of the solids is strongly affected by the response of the fluid, and vice versa, a coupled fluid-structure interaction is necessary and achieved in this work.*

Engineering Applications

32. OPTIMIZATION OF THE TRIBOLOGICAL AND VIBRATORY BEHAVIOUR OF THE ROCKER ARMS OF A FOUR-VALVE ENGINE

pp. 254-260

by B. FANTINO & B. BOU-SAID

Laboratoire de Mécanique des Contacts et des Solides, I.N.S.A de Lyon, France

Abstract: *The aim of this work is to model the dynamic and tribological behaviour of the valve train of an industrial vehicle engine to understand the phenomena involved in its functioning. This model allows identifying and quantifying the significant parameters for the optimization of the mechanical system. For instance the results show that the working conditions of such a mechanism give a very important relative axis eccentricity: it can be upper than 0.98 for a radial clearance of 33 μm . This induces very small minimal film thicknesses: lower than 0.33 μm that are of the same order of the surface roughness. The given friction torque becomes zero when the fall speed becomes zero: this allows determining power losses in the contact ($P=C\omega$). The axial flow represents the leak flow due to the hydrodynamic load. This flow is close to the load area and presents some important variations inside the given clearances. It turns out to be very small for the minimum radial clearance, which induces a smaller evacuation of the power losses and thus film degradation.*

33. ESTIMATION OF THE POWER LOSSES IN KINEMATICAL PRECESSIONAL TRANSMISSION

pp. 261-264

by Ion BOSTAN, Valeriu DULGHERU & Ion BODNARIUC

Department „Theory of Mechanisms and Machine Parts”, Technical University of Moldova – Chisinau, Republic of Moldova.

Abstract:

34. SOME ASPECTS OF CONTACT STRESS CALCULATION IN PRECESSIONAL TRANSMISSIONS

pp. 261-269

by Ion BOSTAN, Valeriu DULGHERU & Dumitru VENGHER

Department „Theory of Mechanisms and Machine Parts”, Technical University of Moldova – Chisinau, Republic of Moldova

Abstract:

35. BEARING CONDITION MONITORING USING THE TIME WAVEFORM TECHNIQUE

pp. 270-275

by Carmen BUJOREANU & Nicolae MITU

Technical University “Gh. Asachi” of Iasi, Iasi, Romania

Abstract: *In the recent years, there has been resurgence in the use of time waveform analysis technique. Condition monitoring personnel find the time waveform analysis process difficult and the technique is rarely used to its full potential. The key to the successful utilization of time waveform data is knowing when to use it. The paper details in practical terms how to set up, acquire and manipulate time waveform data for bearing condition monitoring. The paper continues to discuss the interpretation of the data including the time-frequency relationship, symmetry, and pattern recognition of common defaults.*

36. PREPARATION OF TIN NANOPARTICLES USED AS OIL ADDITIVE

pp. 276-279

by Constantin GHEORGHIES¹, Ioan I. STEFANESCU², Livia GHEORGHIES³, Sorin CIORTAN² & Gabriel ANDREI²

¹Department of Physics, “Dunarea de Jos” University of Galati, Romania

²Department of Tribology, “Dunarea de Jos” University of Galati, Romania

³Department of Materials Science, “Dunarea de Jos” University of Galati, Romania

Abstract: *In this paper a method concerning preparation by chemical path of tin thin powder having availability to be used as oil additive is presented. It describes the possibility to obtain tin nanoparticles from bulk metal by chemical dispersion and stabilizing of droplets into certain solvent. By X-ray diffractometry is shown that the obtained tin powder is into crystalline state having the same type of lattice as bulk metal. By SEM technique the average dimension of particles was estimated it being around of 30nm.*

37. THE INFLUENCE OF CAM PROFILE DEVIATIONS ON THE CAM-FOLLOWER COUPLER WITH FLAT DISC LUBRICATION

pp. 280-287

by Constantin ONESCU & Nicolae POPA

University of Pitești, Romania

Abstract: *In this paper it shows that the small variations of cam profiles – undulations or smallest wears – adhesive type, in generally create high variations of the follower accelerations, in this way the inertia force surpass the initial values considered in design of this mechanisms. The contact cam and follower surfaces deforms elastically, sometimes even plastically, generating rectangular contact areas in which exist always rolling and sliding motion. In this context, the present paper studies the influence of the cam profile deviations on the follower movement laws, respectively cam-follower contact and on the tribologic parameters from contact.*

38. ASPECTS OF MOTION TRANSMISSION BETWEEN TWO AXISIMMETRIC BODIES

pp. 288-293

by Stelian ALACI¹, Romeo GLOVNEA² & Florina Carmen CIORNEI¹

¹“Stefan cel Mare” University of Suceava - Romania, Department of Applied Mechanics

²Brunel University Uxbridge, United Kingdom

Abstract: *The paper broadens a series of research papers upon transmitting rotational motion between crossed axes through a high pair obtained from revolving surfaces. Theoretical kinematics aspects of the problem are introduced followed by the description of the test rig and the analysis of the experimental results.*