

ABSTRACTS

Tadeusz Bil

Bennett Mechanism in the geometry of tori

Works of many authors present Bennett Mechanism as an example of inconsistency of models for calculating degrees of freedom. Based on the classic equations, spatial mechanism's degree of freedom is negative (-2). Frequently, such a mechanism is presented as one with overconstraints of unspecified nature. However, the actual degree of freedom of a mechanism discovered by Bennett equals unity. This paper shows the mechanism is constructed with radii of two overlapping tori obtained with use of different parameters. This explains the actual degree of freedom of the mechanism by qualifying it to the common group together with plane and spherical mechanisms.

Andrzej Burghardt

Modelling of dynamic mobile robot using a Appell equation

In this article I present dynamic movement equation of the mobile robot, built by using Appell equation. As an example I chose the mobile robot Amigobot which characterized by physical size like moment of inertia, mass ect. used during modelling. The robot was given kinematic equation of movement which allowed to describe the speed and acceleration of characteristic points. Moreover, I eliminated unknown values a force dry friction from the model by using Maggi equations. In the research we used the program Maple for generating equations.

Jacek Buśkiewicz

Optimal synthesis of open paths generators

The synthesis method of planar mechanisms generating open paths was presented. On the base of taken assumptions mathematical formulas for the synthesis of four-bar linkage and crank-slider mechanism were derived. The method can be adopted to the other planar mechanisms with three moving links. The results of the numerical experiments for chosen curves were presented and discussed.

Łukasz Derpeński, Andrzej Seweryn

Experimental investigation of ductile fracture specimens with nothes made of aluminium alloy EN-AW 2024 and EN-AW 2007

The paper presents results of experimental tests on uniaxial tension specimens with radius nothes made with ductile material-aluminum alloy: EN-AW 2024 and EN-AW 2007. Authors pay attentions to shape of crack surface, changing of critical forces and maximum displacement – the reasons depends on notch's radius and diameter of specimen at notch root.

Łukasz Dworzak, Tadeusz Mikulczyński

Synthesis Grafcop method of concurrent procedures in which steps execution is indicated by logic and time conditions

The paper presents a method for the synthesis of con-current control algorithms in which control steps execution is indicated by logic and time therms. The developed principles simplify the network transformation method (MTS) of program-ming production processes in the scope of the memory realisation. Thanks to this, time for synthesising the schematic equation can be significantly reduced in comparison to the MTS method. The designed schematic equation makes a ground for writing an application program of a PLC using any language defined in standard PN- EN 61131-3:2004-Programmable controllers-Part 3: Programming languages.

Tomasz Geisler

Free vibration analysis of the body system of the truck crane DST-0285 with considration of the system configuration changes

The coupled model of the truck crane consisted the main units of the machine is considered. The model has been completed by the use of the COSMOS/M package with the application of the finite element method. On the basis of the created models the investigations of the influence of the load position and the configuration changes of the truck crane on the system's free vibration frequencies have been done. The exemplary numerical results of the completed investigations have been presented.

Andrzej Kazberuk, Michał Niedźwiedź

Effect of notch shape on the stress distribution alongside edges

The stress field distribution alongside edges of two different infinite V-notch contours was presented. The comparison included hyperbolic notch and wedge with straight edges rounded at the top with the circular arc. The notch opening angles and curvature at notch apices were the same. Two basic stress states – symmetrical (mode I) and antisymmetrical (mode II) were analyzed.

Tomasz Kopecki, Hubert Dębski

Post-critical deformations state of multi-section, multi-stringer thin walled structure, subjected to the torsion. Experimental research and non-linear numerical analysis

Paper presents results of experimental and numerical research of thin-walled structure reinforced by ten stringers and four frames, subjected to the torsion. The experimental structure was made of the polycarbonate, for which the tensile strength test was carried out and material constants determined. It also characterized by the high optical activity thanks to which it became possible to obtain qualitative information about optical effect distribution in circular polarization conditions. As the result of the torsional load, the post-critical deformations state comes out in all area of the model. Using non-linear numerical analyses, keeping the compliance of equilibrium paths, the stress field considering bending and membrane effects was obtained.

Janusz Kowal, Andrzej Sioma

The method of building 3D product image using vision system

The article discusses of using possibility three-dimensional vision system in process of 3D product image building. The method of selecting suitable geometry for vision system based on camera and laser lighting is presented. The influence of geometry selection on resolution in vision system and the method of image processing are presented for creating the profile of height in product section.

Piotr Krawiec

Design and forming of teeth of noncircular cogbelt pulleys

There was presented issue of design and forming of teeth of noncircular cogbelt pulleys. There were discussed classical manufacturing methods of pulleys and there were pointed their advantages and disadvantages. There were given basic mathematical relationships applied to description of geometrical features of envelope of noncircular pulleys. There were presented researches, which are illustrated in photos, conducted by author in scope of noncircular pulleys production. There was pointed a lack of standardization of measuring methods of geometrical features and surface stereometry of noncircular pulleys.

Tomasz Kuźmierowski

Analysis of the geometrical accuracy of the positioning of the effector of the parallel manipulator spatial type Triplanar

The article presents an analysis of geometric accuracy of the positioning of the effector of the triplanar manipulator. This construction is a spatial parallel manipulator with effector of six degrees of freedom. The author presents the simulation and workplace examinations of the geometric accuracy of positioning in the functions of the height of the point of the work for chosen manipulator's configuration parameters.

Paweł Łaski, Ryszard Dindorf, Jakub Takosoglu, Piotr Woś

Project of pneumatic parallel manipulator type Delta with pneumatic muscle actuators

In the paper a design of electro-pneumatic parallel 3-DOF manipulator type of DELTA with pneumatic muscle actuator are presented. The solid model, construction, control system and design work are performed. Positioning control of pneumatic bi-muscular driving system was designed and constructed by means of xPC Target software of Matlab-Simulink package for rapid prototyping and hardware-in-the-loop simulation.

Jerzy Madej, Maksymilian Dudyk

Numerical simulation of thermal identification of gas porosity and inclusions in aluminum alloys

The paper presents the results of numerical simulations showing temperature distribution in the mould aluminum casting during the pouring mould and in the early phase of self-cooling of the casting. Special attention was devoted to the influence of gas pores and inclusions on the temperature distribution on the casting surface during self-cooling in steel mould. A possibility of locating inner defects by means of analysis of distribution of temperature on the casting surface submitted with short thermal impulse was investigated. Changes of thermal conductance caused by the presence of inner defects were observed by analyzing the temperature distribution on the casting surface. These changes presented on the included thermographs and thermo profiles enable to unequivocally locate the regions containing defects. The results achieved confirm the effectiveness of the thermal method for locating potential defect regions in alloys directly after the pouring into moulds and for diagnosing the defects in ready castings.

Romuald Mosdorf, Tomasz Wyszowski

The gas bubbles detachment from the nozzle experimental investigations and modelling

The result of experimental investigations of bubbles emission from brass nozzle with inner diameter equal to 1.1mm has been presented. The air pressure, time of passing bubbles through laser beam and dynamics of bubbles deformation have been simultaneously recorded. The bubbles detachment from the nozzle has been modelled using the set of ODE which describes the spring interaction between gas bubble and liquid. In the model and experiment the chaotic behaviours of bubbles have been observed. The obtained results can be summarized as follows: the chaotic behaviours of bubbles detachment from the nozzle can be caused by non-linear character of interaction between liquid and the system consisting of spherical bubble and air supply system.

Andrzej A. Stępniewski

Analysis of structural, geometrical and static of knee-joint mechanism

This article shows structural, geometrical and static analysis of the knee-joint. Mobility was determined and passive bonds were identified. The basic dimensions were defined, necessary for description of geometry of joint. Simplified flat model was accepted for mobility analysis. Using the transformation of arrangement co-ordinate Denavit-Hartenberg, vectors of sites characteristic of bones of femoral bone, according to tibial bone were defined. Loads of elements of the joint were set. Computational being example was put illustration of discussed algorithm.

Jakub Takosoglu, Ryszard Dindorf, Paweł Łaski, Piotr Woś

Positioning of electro-pneumatic servo-drive with direct displacement and velocity transducer

In the paper a research stand to positioning of electro-pneumatic servo-drive with direct displacement and velocity transducer are presented. The fuzzy logic controller constitute the control system. The performance control of the pneumatic servo-drive with new transducer was checked by means of standard performance index.

Mirosław Tarasiuk, Zdzisław Gosiewski

Speech segmentation in polish language by wavelet transformation

This article introduces an conception on polish spoken words segmentation using wavelet transformation. There was suggested an algorithm and presented achievements made during researches. Spoken words were then divided and their segmentation correctness was verified with use of mentioned above method. This study provides a base platform for further development of the automatic speech recognition system. Research and calculations were executed in MATLAB.

Roman Trochimczuk

Study of construction a new polar positioning system for laser device for 3D subsurface glass engraving

New construction of mechatronics polar positioning system of laser device for engraving glass and other transparent dielectrics there is presented in the work. The results of analysis of stiffness Cartesian positioning system and alternative new polar positioning system are presented too. The description of the constructions of working arm and rotation table of polar positioning system is given in the paper. Possible applications of describe polar positioning system are defined. Presented in the work construction of movement device brings the new quality of positioning (a synergy effect) through connection the computer control technology with the simple polar mechanism similar to construction of computer hard drive.

Andrzej Urbaś, Marek Szczotka

Application of the neural network in control of a flexibly supported crane

The paper presents the application of the neural network to real-time control of drive characteristics. The mathematical model of the crane, which is flexibly supported, is considered. The problem of finding an optimal drive function can be solved by mean of the classic optimisation methods. However, due to long calculation time, this approach can not be applied in the crane control tasks in practice. Utilising the advantage of neural networks (fast response, ability to generalisation), we are able to obtain the courses of drive functions in the real-time. A well trained network can be then used also for other inputs, than those used during the training task. Some example of simulations have been presented in the article.

Andrzej Zniszczyński

Application of multisegment rotors about the variable jump of the helix in the air-compressor with four parallel synchronous rotors

The article introduces the method of obtaining internal compression in compressors built on the basis of the displacement machine with a team of four synchronous helical rotors. Previous prototypal construction of this type of compressor, examined in research laboratory, permitted only external compression. In the article the essence of the new method is explained and technological restrictions of its realization are indicated.

Wiesław Żylski, Piotr Gierlak

Modelling of movement of selected manipulator

In his paper modelling of movement of manipulator SCORBOT-ER 4pc is presented. Kinematics and dynamics equations, sensitivity equations and identification procedure are presented. Identification procedure based on principle of equivalence of kinetic energy and work. In identification signals from experiments are used. Results of verification of identification procedure and parameters of manipulator are presented.