

ABSTRACTS

Wiesław Barnat, Tadeusz Niezgoda

The experimental investigation of influence of kind geometry of fullfilment basic composite structures on energy the destruction

The opinion of applied fullfilment is on ability the aim of the absorption through composite unit of thin-walled construction the energy weighted down dynamically. Energy-consuming units were executed in KMiIS. It investigations were conducted was on stamina machine engine Intron. The investigations were subjected in figure of muffs the energy-consuming units from additional foam fullfilment. Weight was realized by axial input function kinematic.

Mariusz Bogdan

Simulation and testing of edge detection algorithms for flight among street canyon

In the article the methods for edge detection in the Matlab's software environment were tested and analyzed. The primary focus is placed on the gradient methods. In order to simplify the information comprised in the registered images (frames) an analytical description of the detected edge-obstacles was proposed (Hough's transform).

Stefan Bućko, Henryk Jodłowski

The initiation of plastic deformations in beams under pure bending

The results of experiment on plastic deformation initiation in steel with physical field point under stress gradient action are presented in the work. The authorship method based on using optical interference effect to identify plastic deformations in steels exhibit material instability was applied to the tests. The experiments were carried out on beam specimens made of St3 steel and 45 steel put to the constant moment bending tests. The images of plastic zones distribution and their propagation along the beam height were observed and documented on CCD films. Also the load values correspond to first plastic deformations in the specimen were determined. It was observed that the first plastic deformations are the results of plastic slips distributed discretely along the beam specimen longitude.

Yevhen Chaplya, Tomasz Karasiewicz, Julian Polański

The thermodynamical description of inelastic proceeding of solid solutions

In this article the mathematical models for mechanical processes, thermal conductivity and diffusivity of binary solids with regard to inelastic behavior are presented. Key model equations were derived by applying the methods of thermodynamics unbalance and continuum mechanics. The set of equations was formulated for dislocation function, temperature and concentration of admixture component. The calculated set of equations represent reciprocal influence of deformation, temperature change and the concentration of the material solid components.

Krzysztof Ciechacki, Tadeusz Szykowny

Destruction of different name welded joints in dynamic loading conditions

The basic aim of this work is marking the breaking of different joint welded in both weld and in HAZ (heat affected zone) and defining of breaking character. In microfractographical research the scanning microscopy method SEM was used. In order to define the phase composition and physicochemical steel the diffractational X-ray research were done. Steel of ferritic structure was of X2CrNi12 type was used and austenitic structure of X5CrNi 18-10 type. Welding of GMA method by using three different types of weld was done. The impact tests were done in temperature of -20°C.

Ryszard Dindorf, Paweł Łaski, Jakub Takosoglu

Design and control development of a pneumatic parallel manipulator of tripod type

The paper deals with design and control development of pneumatic parallel manipulator of tripod type. Pneumatic parallel manipulator consists of fixed base, moving platform and three pneumatic linear motions. Kinematic structure of manipulator is composed of three kinematic chains containing universal joint (U), prismatic joint (P) and revolute joints (R). Prismatic joints are pneumatic cylinders used as axis drives. In the first version of manipulator rod pneumatic cylinder was applied. The next version contained rodless pneumatic cylinder. The final version of pneumatic parallel manipulator of 3-UPRR kinematic structure with servo-pneumatic axis consists of: rodless pneumatic cylinder with integral position and velocity transducer, servo-valves, axis interfaces, positioning axis sub-controller and Ethernet/Can Bus interface.

Maksymilian Dudyk, Jerzy Madej

The influence of purifying processes on crystallization and quality of aluminum casting

The research concerned on the influence of purifying and modification as well as filtration processes on the crystallization and the quality of aluminium die-casting from alloys: AK9 (ENAC – AlSi9Mg) and AK11 (ENAC – AlSi11). The metallographic research results show impurities in the casting structure in the form of porosity and oxides, which arose during metallurgic process. Microstructures of filters poured with the researched alloys present the amount and distribution of the impurities stopped (in filters) during casting of resistance samples. Implementing of purifying processes for the mentioned alloy caused significant differences in the shape of crystallization curves received in the graphical record of ATD-AED method. On the example of comparison of hypo-eutectic AK9 alloy and refined alloy it was shown that it is possible to achieve significant improvement in mechanical properties, elongation A_5 and impact resistance and especially R_m resistance. The original research on microstructures of poured ceramic foam filters proved advisability of implementation of filtration processes into the technology of aluminium casting.

Artur Handke, Władysław Twaróg

Correlation of the sensory parameters' mathematic models with the kinematic structure of the HAND-K3 hand type manipulator

This paper refers to functional connection of set of mathematical models of tactile sensor array disposed in groups of each finger phalanx in the prototype manipulator with the configuration of its motor connections in time. Correlation of previously elaborated mathematic model of the sensor array in metacarpus's coordinate system of the manipulator's hand served for conducting series of experiments, measurements and establishing key criteria used in the optimizing process of the hand type manipulator's kinematic structure. The main goal of this work is to generate a set of functions and transformations common in the theory of manipulator's, essential in designating rules in controlling the movement of finger modules in the HAND-K3 hand type manipulator prototype in interaction with examined objects.

Mirosława Kołodziejczyk

Estimation of the discretization uncertainty of an unsteady ventilation problem in a habitable room

This article presents a study of estimation of the numerical uncertainty due to discretization of an unsteady ventilation problem in a habitable room. The numerical results are obtained with the code ANSYS-CFX. Careful considerations are given to selection of the verification procedure for the results being outside the asymptotic range. The results are presented with discretization error bars computed with 95% confidence.

Mirosław Kondratiuk, Piotr Kłoskowski

Preliminary investigations on aerodynamics of micro delta wing with mechanical barriers located near edges of attack

In this paper the idea of micro UAV and preliminary calculations with mechanical barriers implemented near edges of attack were presented. The world-wide investigations on such a problem were shortly described. Air pressure distribution on plane lift surfaces was obtained by means of numerical calculations. Aerodynamics forces and coefficients values were determined. Results of calculations conducted for delta wing without barriers were compared with those obtained for plane with mechanical edge turbulizers. The obtained position and dimensions of the barriers should ensure the best possible aerodynamic forces values modifications. The calculations were conducted with a view to taking advantage of edge mechanical barriers in order to control the MAV flights.

Andrzej P. Koszewnik

Sliding mode control of the MAV with used eralier calculated aerodynamical forces and moments

Nowadays control of MAV progressed in typical way by surface lift vehicle. Sometimes in relative limited possibility structural we may changed way control of MAV. Simultaneously we have changed way appear leading edge vortexes on vehicle. The paper was divided on two stage. In the first step was consider mathematical model of MAV with movable bar mechanical on leading edge. In second step was designed control law for control movable mechanical bar based on sliding controller. Obtained results in simulation was collected and compared.

Cezary Kownacki

Control algorithm of micro aerial vehicle flight in streets' canyons based on vision system

The paper presents a control algorithm of autonomous flight of micro aerial vehicle in streets' canyon using camera as a source of information about surrounding environment. The algorithm structure and the video processing routines were designed in the way which enables possibility of the algorithm realization using available devices such as micro cameras, advanced autopilots and DSP processors. Basing on the designed algorithm model a simulation experiment was conducted. The results confirm the effectiveness of the proposed control algorithm of micro aerial vehicle autonomous flight in streets' canyons. The simulation didn't use the real video signal, but only simplified model of perspective view on street map was employed. That is why the research should be continued including all steps of video processing routine.

Cezary Kownacki

Study on flight control algorithm of micro aerial vehicle in unknown urban environment

The paper describes the idea of autonomous flight control of micro aerial vehicle in streets' canyons, which is based on two laser rangefinders and advanced autopilot. The sensors are mounted so as to create plane V shape of laser beams and they are scanning distance between micro aerial vehicle and buildings creating street canyon. The additional routine realizing conducted algorithm based on PID controllers can be built in the autopilot firmware and it will take charge of flight control when critical distance is detected. To analyze effectiveness of proposed algorithm, the simulation experiment was prepared in MATLAB – SIMULINK software and its results present collision free flight trajectories. So the realization of proposed algorithm allows creating autonomous micro aerial vehicle which will be able to fly in urban environment.

Stanisław Mroziński

Influence of the programmed loading on the cyclic properties of 30 HGSA steel

In the paper there were presented the results of the comparative analysis of cyclic properties of specimens made of 30 HGSA steel under constant – amplitude and programmed loading. The analysis was performed with the use of the hysteresis loop parameters (σ_s , ϵ_{sp} , ΔW_{pl}) in the function of the fatigue failure rate. The performed analysis showed that courses of the cyclic properties changes at the same strain levels were very similar and did not depend on the loading program.

Arkadiusz Mystkowski

Aerodynamics analysis of Micro Air Vehicle (MAV) delta wing with controlled vortex piezo-generators

In the paper, the aerodynamics and flexible structural dynamics investigations of the Micro Air Vehicle (MAV) delta wing with vortex piezo-generators are presented. A numerical methodology coupling *Navier-Stokes* equations and structural modal equations for predicating vortex generators in 3D delta wing are investigated. The two-way coupled numerical calculations with fluid structure interaction (FSI), where the air in the boundary layer interacts with the solid structure of the vortex generator surface, are applied. The flexible moving surfaces deformations (small plates assembled in the wing surface) driven by controlled piezo-stacks are simulated and their influence on the air flow in the delta boundary layer was calculated. Simulation results which show significant improvements in delta control by the vortex generators are presented.

Walenty Osipiuk, Krzysztof Łukaszewicz

The estimation strength of materials hypotheses applicability to the fatigue life prediction of construction elements

An aim of the work is the analysis of fatigue life experiments results on the INSTRON 8502 machine. For testing applied hour-glass shaped specimens under proportional biaxial cycling loads state (combination tension - torsion). In the paper estimations the usefulness hypotheses Huber, Tresca and Sdobyrev, to define of the fatigue life were worked.

Mykhaylo P. Savruk, Andrzej Kazberuk

On selected fracture mechanics problems for bodies with sharp and rounded V-notches

The review of research in the field of fracture mechanics of solids with V-shaped notches was presented. First, we analyzed methods for solving two-dimensional problems of elasticity for domains with angular points. We considered numerical methods of finite and boundary elements, boundary collocation and method of singular integral equations. Particular attention was paid to a unified approach to solving problems of stress concentration near the sharp and rounded V-notches. This approach is based on applying the method of singular integral equations for elastic domains with rounded corners, i.e. the areas with a smooth border. Using modern computers and new methods of calculating quasi-singular integrals allowed obtaining solutions of problems for very small radii of curvature at the notch apex. Applying limit transition we found the stress intensity factors in sharp V-notch vertices. Some known and new results were obtained by this approach. Then, we considered the fracture criteria of solids with notches. Based on the solution of the problem of rounded V-notch with plastic strip at top a new deformation fracture criterion was proposed.

Maciej Ł. Słowik, Daniel Oldziej

Experimental verification of parameters and characteristics of robotic rangefinder

Sensor equipment of autonomous mobile robot (AMR) significantly influence control process of robot. In the paper authors have surveyed sensors that can be applied to AMR. Infrared rangefinder GP2Y0A0YK is submitted to detailed examination. Measurement path was designed. In next step, static characteristics are examined and compared with those from data sheet given by producer. For dynamical research two sensors are installed on experimental mobile platform. Measurement signals and their mutual interfering for stationary and mobile obstacles were examined.

Marek Szczotka

Dynamic analysis of an offshore pipe installation using the J-lay method

The paper presents mathematical models developed for dynamic analysis of an offshore pipeline installation under wavy sea conditions and currents. The rigid finite element method has been applied in order to discretize the pipeline. Internal forces due to material deformation are treated as the external loads, which allow a nonlinear material characteristics to be taken into account. In order to define the motion of the surface vessel, a kinematic input has been assumed. Typical RAO's of an offshore construction vessel have been applied. The soil-pipe interaction, as well as fluid-pipe interaction are considered in models analysed. In both interactions a semi-empirical formulation have been applied. Fluid-structure interaction is based on the Morison equation for slender members, while the DNV's rules are used for the soil modelling. Numerical simulations have been performed and the results attached show the level of forces during installation. Wave and current loads are investigated, as well as different pipe diameters. Some validation of the programme developed has been presented, too. A planar model of a riser is investigated in the ANSYS environment which forms the basis for indirect verification of the method.

Józef Wojnarowski, Jerzy Margielewicz, Wiesław Chladek

Badania modelowe jako narzędzie identyfikacji sił mięśni żwaczowych

The paper presents a methodology to identify the forces of masticatory muscles. The proposed approach was evaluated masticatory muscle forces, including the impact of the nervous system. This method of research is an alternative model of the problem of balance of masticatory biostatic, with respect to existing methods of calculations. In addition, in carrying out numerical calculations take into account constraints related to the maximum capacity of the individual muscles. The results of numerical calculations are presented in the form of time histories of forces of masticatory muscles and the characteristics of mapping decisions and brokering the impact of application of external load to the arch of the mandible.

