Abstracts of Papers (2005)

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Influence of Containerless Solidification on Hardness in Multifunctional Titanium Based Alloys, Tomotsugu AOYAMA, Haruki KAWAMURA, Shigeo KOTAKE and Yasuyuki SUZUKI, Key Engineering Materials, 297-300, pp. 495-499, 2005.

Development of Fabricating Method of Nanoscale Pit with High Aspect Ratio Using Carbon Nanotube Probe, Norikazu ARIMA*, Tomohiko SUGIYAMA*, Yohei FUJIMOTO*, Shigeo KOTAKE and Akihito MATSUMURO*, Journal of the Japan Society for Precision Engineering. Supplement. Contributed papers, 30, pp. 867-871, 2005.

Introduction of the Basic Topics on Quantum Calculation: The Image of Quantum Calculation and Quantum Gate, Shigeo KOTAKE, Res. Rep. Fac. Eng. Mie. Univ., 30, pp.13-37, 2005.

Quantum Search Algorithm from Plural-phase Database with Single Query, Reiko MATSUMURA and Shigeo KOTAKE, ERATO Conference on Quantum Information Science ’05, pp. 195-196, 2005.

A Formulization of Camera-Parameter Calibration Errors and Resultant Visual-Line Estimation Errors, Yoshihiko NOMURA,Takashi FUJIMOTO, Dili Zhang,Trans. of JSME PartC, 71(706), pp.1937~ 1945,2005

The 3-D information obtained from cameras' 2D images is given as a visual line by using calibrated parameter values, and we should evaluate the calibration accuracy with respect to the visual line direction error. In this paper, the visual line direction error was examined, based on an evaluation criterion where the calibrated principal point coordinates are taken as the references of the visual line. Many important characteristics with the calibrated parameter value errors and their resulting visual line direction errors were found out by conducting a large amount of simulations under various conditions such as the depth ratios of calibration chart, and the principal distances of cameras. Finally, the error characteristics were analytically proved, and some formulae were derived. The formulae enable us to estimate calibration errors for any calibration conditions in advance.

Direction-Indicating, Traction Manipulator to Support Mental Image Creation of Line Drawings, Yoshihiko NOMURA, Maki OMOTO, Tokuhiro SUGIURA, Hirokazu MATSUI, and Norihiko KATO, CD-ROM Proc.11th Intern. Conf. On Human-Computer Interaction, pp.1~6,2005

A mechatronics system to support mental image creation was developed. The mechanical part of the system is a 3-DOF manipulator that is composed of a 2-DOF quadrilateral parallel-link actuator and a rotational actuator embedded at arm-end of the parallel-link. A couple of servomotors of the 2-DOF manipulator control the arm-end

position. The arm-end actuator controls the direction of a knob attached to the rotational actuator axis. The person is assumed to pinch the knob by his/her fingertips. The knob is rotated to indicate the direction of the on-going stroke, and the position of the knob axis traces the strokes of the presented figures sequentially. A couple of preeminent functions are embedded in the process: one is a preparation effect by "the direction-indicating function, " and the other is the reviewal effect by "the traction function." The direction-indicating and traction functions play complementary role.

Study on the high compression processing of lecture image data, Yoshihiko Nomura, Ryutaro Matsuda, Ryota Sakamoto, Tokuhiro Sugiura, Hirokazu Matsui, and Norihiko Kato, J.of Japanes Society for Engineering Education, Vol.58(5), pp.107~111,2005

The authors proposed a high-quality and small-capacity lecture-video-file creating system for distance e-learning system. Examining the feature of the lecturing scene, the authors ingeniously employ two kinds of image-capturing equipment having complementary characteristics: one is a digital video camera with a low resolution and a high frame rate, and the other is a digital still camera with a high resolution and a very low frame rate. By managing the two kinds of image-capturing equipment, and by integrating them with image processing, we can produce course materials with the greatly reduced file capacity: the course materials satisfy the requirements both for the temporal resolution to see the lecturer's point-indicating actions and that for the high spatial resolution to read the small written letters. As a result of a comparative experiment, the e-lecture using the proposed system was confirmed to be more effective than an ordinary lecture from the viewpoint of educational effect.

High-Quality and Small-Capacity Lecture-Video-File Creating System for Distance E-Learning, Yoshihiko Nomura, Ryutaro Matsuda, Ryota Sakamoto, Tokuhiro Sugiura, Hirokazu Matsui, and Norihiko Kato, Proceedings of E-Learn 2005, pp.2264~2269,2005

The authors proposed a high-quality and small-capacity lecture-video-file creating system for distance e-learning system. Examining the features of the lecturing scene, the authors ingeniously employ two kinds of image-capturing equipment having complementary characteristics: one is a digital video camera with a low resolution and a high frame rate, and the other is a digital still camera with a high resolution and a very low frame rate. By managing the two kinds of image-capturing equipment, and by integrating them with image processing, we can produce course materials with greatly reduced file capacity: the course materials satisfy the requirements both for the temporal resolution to see a lecturer's point-indicating actions and for high spatial resolution to read small written letters. As a result of comparative experiments, an e-lecture using the proposed file creating system was confirmed to be more effective than an ordinary lecture from the viewpoint of the education effect.

High performance file compression algorithm for video-on-demand e-learning system, Yoshihiko Nomura, Ryutaro Matsuda, Ryota Sakamoto, Tokuhiro Sugiura, Hirokazu Matsui, and Norihiko Kato, Proc. Part of SPIE Conference on Intelligent Robots and Computer Vision XXIII:Algorithms,Techni ques,and Active Vision, 6006, pp.60060X-1~60060X-6,2005

Information processing and communication technology are progressing quickly, and are prevailing throughout various technological fields. Therefore, the development of such technology should respond to the needs for improvement of quality in the e-learning education system. The authors propose a new video-image compression processing system that ingeniously employs the features of the lecturing scene: recognizing the a lecturer and a lecture

stick by pattern recognition techniques, the video-image compression processing system deletes the figure of a lecturer of low importance and displays only the end point of a lecture stick. It enables us to create the highly compressed lecture video files, which are suitable for the Internet distribution. We compare this technique with the other simple methods such as the lower frame-rate video files, and the ordinary MPEG files. The experimental result shows that the proposed compression processing system is much more effective than the others.

Proposal of Serially and Dynamically Separating Genetic Algorithm and Its Application to Optimization of Robot Control Systems, Koichi NAKAYAMA, Hirokazu MATSUI, Katsunori SHIMOHARA, Osamu KATAI, Proceedings of the Tenth International Symposium on Artificial Life and Robotics, pp.467-470 2005

Impedance control for an industrial power assist device, Ryojun IKEURA, Hiroyuki KATO, Sinpei NOGUCHI, Kazuki MIZUTANI and *Hisashi NAKAMURA, Proceeding of Robotics Symposium in Japan, pp.191-196, 2005.

This paper describes a control method for a power assist device used in factories. An adaptive control scheme is employed to control the power assist device and to estimate its dynamic parameters. Using the adaptive control, the maneuverability of the system is good in free space but it is very dangerous in the task of which an object supported by system contacts on a floor or a wall. Therefore, we propose an improved system controlled by an adaptive control in which the local control method changes to a feedback or a feed forward control in the contact condition. The improved system detects collisions based on the difference between the actual input torque to the power assist device and reference input torque, which is calculated based on the estimated parameters of the manipulator dynamics. Then, the effectiveness of the system is shown.

Chaos and multiple period vibrations for a dynamic system with the piecewise linear stiffness, Kazuki MIZUTANI, *Takaaki SHIBATA, Hideki SAWAI and Ryojun IKEURA, Proceedings of the 12th International Congress on Sound and Vibration, pp.2041-2048, 2005

This paper studies the influence of the damping on chaos and multiple period for a harmonically excited dynamic system with piecewise linear stiffness. The analysis of the simulation and the experiment is based on many data processing techniques, such as, the frequency response curve, bifurcation diagram, FFT, phase plane diagram and Poincaré map. For relatively small damping, the chaos occurs suddenly after period 1, and the frequency region where the chaos occurs becomes wider as damping increases. For large damping, the chaos region becomes narrower as damping increases.

Analysis of the characteristics of human arm in cooperative motion between two humans, Nan ZHANG, Ryojun IKEURA, Kazuki MIZUTANI and Hideki SAWAI, International Conference on Mechatronics and Information Technology, pp.624232-1-7, 2005

This paper describes the characteristics of human arm in the cooperative motion by two humans. The experiment was carried out on a hypothesis that the human arm around the elbow joint was considered as a simple mass-spring-damper dynamic system with one end fixed. In the investigation of the relaxed arm in

clockwise motion from the equilibrium position by examining the physical parameters in the mathematical model of the human arm, its impedance characteristics were recognized. It was found that the damping factor was zero and the stiffness was individually linear. And besides, the friction-like force was discovered to exist.

Automatic system, Ryojun IKEURA, Encyclopedia of Ergonomics by Maruzen Co. Ltd., pp.470-471, 2005.

Cooperative control, Ryojun IKEURA, Handbook of robot engineering by Robotics Society of Japan, pp.828-830, 2005.

New Surgical Technique for Femoral Shaft Fracture with Shape Memory Alloy Intramedullary Nail [in Japanese], T. Katoh, Y. Kasai*, H. Kachi, T. Inaba, M. Tokuda, A. Uchida*: Orthopedic Surgery, Vol.56, No.5, pp.599-602 , 2005.

An Experimental Study on Shape Memory Characteristics of Casted Ti-Ni Shape Memory Alloy [in Japanese], K. Kitamura*, T. Kuchida, T. Inaba, M. Tokuda, Y. Yoshimi*: J. Japan Inst. Metals, Vol.69, No.8, pp.604-607, 2005.

Biomechanical Study for Ultimate Position of Lumbar Interbody Spacer [in Japanese], I. Nishimura, Y. Kasai*, T. Inaba, A. Uchida*, M. Tokuda: Japanese J. of Clinical Biomechanics, Vol.26, pp.109-114, 2005.

Equivalent Cross-relaxation Rate Image for Sentinel Lymph Node Biopsy in Breast Carcinoma, S. Mastsushima*, F. Sasaki*, H. Yamaura*, H. Iwata*, H. Ohsaki*, S. Era*, M. Sogami*, T. Inaba, M. Uike*, Y. Kinosada*: Magnetic Resonance in Medicine, Vol.54, No.5, pp.1300-1304, 2005.

Analysis of Elastic-Viscoplastic Deformation ofPlain-Woven GFRP Laminates Using a Homogenization Theory (Domain of Homogenization Analysis) [in Japanese], T. Matsuda*, Y. Nimiya*, N. Ohno*, M. Tokuda: Trans. of the JSME, Series A, Vol.71, No.711, pp.1421-1427, 2005.

Quantitative Evaluation of Left Ventricular Wall Motion in Patient with Coronary Artery Bypass Grafting Using Magnetic Resonance Tagging Technique [in Japanese], T. Inaba, T. Nakano, M. Tsutsumi, S. Kawasaki*, Y. Kinosada*, M. Tokuda: Trans. of the JSME, Series A, Vol.71, No.711, pp.1595-1601, 2005.

The left ventricular wall motion during systole was investigated from a mechanical point of view by using a magnetic resonance tagging technique. Subjects were seven patients with coronary artery bypass grafting (CABG). At first, in order to evaluate the cardiac contractility in each patient, the circumferential strain in myocardial wall was analyzed. It was found from the results that the circumferential strain in four patients decreased compared with that in healthy humans. Next, the paradoxical wall motion in patients with CABG was quantitatively described by calculating the displacement. The results showed that the radial displacement of septal wall in the patients was smaller than that in healthy humans, and the radial displacement of lateral wall was larger. Furthermore, anterior wall and posterior wall moved toward septal wall. Such left ventricular wall motion was recognized in even the patients with normal cardiac contractility. Therefore, it was considered that the paradoxical wall motion in the patients with CABG was not caused by

a drop of the cardiac contractility, but a rigid-body motion of the heart.

Evaluation for Al/Cu bonding by liquefaction after solid phase diffusion in the air, Hiroshi KAWAKAMI, Jippei SUZUKI, Masanori FUJIWARA, Junya NAKAJIMA, Proceedings of the 2005 Spring Annual Meeting of Korean Welding Society, pp.393-395, 2005.

Aluminum is needed as the base metal of some new products, because it has low density and electrical resistivity. However, Aluminum is known as the metal which is more difficult for bonding and welding than steel. One of reason is obstruction effect of the oxide films formed on the surface.
The simple Al/Cu bonding in the air is investigated in this study. This method includes the simple preprocessing and the heating over the eutectic temperature of Al-Cu system.

Effect of Carbon Content and Peritectic Reaction on Hot Cracking of Weld Metals of 0.3 to 0.6mass% Carbon Steels, Hiroshi KAWAKAMI, Jippei SUZUKI, Koreaki TAMAKI, Documents of International Institute of Welding, No.IX-2153-05, pp.1-23, 2005.

Effect of carbon was discussed from the view points of the metallurgical effect of impurity elements in the interdendritic zone and the growth mode of dendrite. The concentrations of phosphorus, sulfur and carbon in the final liquid was estimated by a series of micro-analyses on the particles existing in this zone. The width of dendrite was measured in detail for the weld metal of a series of carbon contents. Weld metals of 0.2 to 0.6% carbon experienced inevitably the peritectic reaction, delta-ferrite + liquid → austenite. The experimental results was analyzed in connection with this reaction. Phosphide particles were observed in the interdendritic zone. The process of producing this particle was discussed on the basis of the phase diagram of Fe-C-P system, and the temperature at which hot cracking occurs was estimated.

Capacitor Discharge precession Welding of Pure Aluminum wire to Pure Copper Sheet, Maiqun ZHAO, Jippei SUZUKI, Hiroshi KAWAKAMI, Fumihiko MATSUYAMA Proceedings of the 7th Joint Seminar of China-Japan Amity Universities on Material Science & Engineering, pp.32-40, 2005.

Percussion welding with pure aluminum wire and copper sheet discussed in this paper. The optimization condition for this joint was investigated systematically. The angle of wire end affects on tensile strength strongly. The assistance by machine oil improved the weld quality with reducing excess heating and oxidation. Rapid solidification and formation of intermetallc compounds in narrow weld are confirmed by SEM observation and EPMA analysis.

Microstructure in Al/Cu Bond with Solid Phase and Liquation, Junya NAKAJIMA, Masanori FUJIWARA, Hiroshi KAWAKAMI, Jippei SUZUKI, Proceedings of the 7th Joint Seminar of China-Japan Amity Universities on Material Science & Engineering, pp.65-70, 2005

The authors are investigating the simple Al/Cu bonding method. This bonding method is composed by the simple processing and the heating over eutectic temperature of Al-Cu phase diagram. In case of this bonding, at first, the solid state diffusion occurs at interface between aluminum and copper. When the composition of a region reaches in liquid-solid two phase area, the liquation occurs in there. Therefore, the solid state diffusion and the liquation occur in

the Al/Cu bond at same time and the unique microstructure forms. In this study, the unique microstructure in the bonded area was investigated by SEM observation and EPMA(WDS) analysis.

Improvement by SR Treatment on Creep Ductility in Welded 2 1/4Cr-1Mo Steel, Hiroshi KAWAKAMI, Koreaki TAMAKI, Jippei SUZUKI, Proceedings of National Welding Seminar NWS2K5 of Indian Welding Society, pp.8-14, 2005.

2 1/4Cr-1Mo steel is used widely for the welded constructions such as boilers and pressure vessels. However, the heat affected zone (HAZ) of this steel is very low in creep ductility[1-4]. The authors investigated this phenomenon by using the synthetic HAZ specimen in which the microstructure of HAZ was reproduced. Stress relief annealing (SR treatment) is usually given to the weldments to remove the residual stress before service. The authors believed that the SR treatment is also effective for improving the creep ductility of HAZ. In this study, the change of creep ductility of HAZ and base metal was investigated by changing the conditions of SR treatment.

Welding in Asia, Hiroshi KAWAKAMI, Journal of the Japan Welding Engineering Society, Vol. 53, No.12 , pp.109-114, 2005, (in Japanese).

Asian countries become to have the big economical power today. Japan is required the strong corporation with all Asian countries for activity related with ISO. The author introduced the friendship activity of Japan Welding Society in new age of Asia and appealed to the readers for commitment to this activity.

Delamination of A-FRP Plate during YAG Laser Drilling, Eitoku NAKANISHI, Takao YOSHIMOTO, Yutaka SAWAKI and Kiyoshi ISOGIMI: Journal of Japan Society of Advanced Production Technology, Vol.23, No.1, pp.26-32, 2005

Simulations of Fiber Deformation during Machining Aramid-FRP, Eitoku. Nakanishi, Masao Fukumori and Kiyoshi Isogimi: Proceedings of 8th CIRP International Workshop on Modeling of Machining Operations, CD-ROM, 2005

YAG Laser Drilling of Aramid FRP Laminates, S. Kohzaki, Eitoku Nakanishi, Yutaka Sawaki and Kiyoshi Isogimi: Proceedings of The 3rd International Conference on Leading Edge Manufacturing in the 21st Century (LEM21), pp.583-588, 2005

Simulations of Aramid fiber Deformation and Fracture Phenomena During Machining A-FRP" , E. Nakanishi, M. Fukumori, Y Sawaki and K. Isogimi, Proceedings of 9th Japan International SAMPE Symposium & Exhibition JISSE-9, pp.875-880, 2005

Research on impact properties of Aramid FRP, Y. Sun, Jun Watanabe, Eitoku Nakanishi, Yutaka Sawaki and Kiyoshi Isogimi: Proceedings of 9th Japan International SAMPE Symposium & Exhibition JISSE-9, pp.645-650, 2005

Wind Tunnel and Field Experiments on Wake Behind Horizontal Axis Wind Turbine, Takao MAEDA, Yusuke KINPARA and Tsutomu KAKINAGA: Transaction of JSME, Series B, Vol.71, No. 701, pp. 162-170, 2005.

Measurement results of the wake velocity profile behind 0.6m–diameter wind turbine in wind tunnel and 10m- diameter wind turbine in the field are shown. The development of wind turbine wake was observed with the use of particle image velocimetry for wind tunnel measurement. Form the results of wind tunnel measurement, the wake was expanded from the position where the tip vortex was almost dissipated. The wake velocity behind field wind turbine was recorded in shorter distance than those for the turbine in the wind tunnel measurement. The wake area was shifted toward radial direction related to wind turbine rotational direction. The wake velocity at lower half area below rotor axis was not much recovered by the effect of the tower compared to those at upper half area above rotor axis.

Experimental Study on Flow around Blades of Horizontal Axis Wind Turbine in Wind Tunnel, Takao MAEDA, Yasunari KAMADA, Yusaku SAKAI and Naoki TAKAHARA: Transaction of JSME, Series B, Vol.71, No. 701, pp. 171-176, 2005.

This paper describes the measurement of the flow field around rotor blade. Three-bladed upwind rotor was tested in an open jet type wind tunnel. The rotor has a diameter of 2.4 m. Flow field around rotor blade was measured with the use of two-dimensional LDV. The flow field was measured in x-y plane and z-y plane. The circulation around the blade sections were calculated by flow vectors around the rotor blade. The velocity vectors at optimum operation show a smooth flow around the blade and the bound vortex around blade cross-section seems to be persistent. On the other hand, the velocity vectors at stall condition demonstrate significant fluctuations in the near wake and separation on the blade suction side was observed. The circulation around blade span-wise section was calculated at the certain control volume. By the observation of flow field and calculated results of circulation, it seems that the flow is separated at the blade from middle-span region to tip region at stall condition. No separation was observed at the blade root region.

Pressure Distribution on Rotating Blade of Field Horizontal Axis Wind Turbine in Yawed Condition, Takao MAEDA and Hideyuki KAWABUCHI: Transaction of JSME, Series B, Vol.71, No. 702, pp. 156-164, 2005.

This paper shows the pressure distribution at 50% radial section on a rotor blade of 10m- diameter wind turbine in yawed operation. The pressure sensors were mounted on the blade, and the local inflow angle and local dynamic pressure were measured with the use of five hole Pitot tubes at 1 chord length upwind of the blade leading edge. With the use of measured pressure distribution on the blade, the blade performances were calculated on the basis of the blade coordinate. As results of the measurements, the normal force coefficient in yawed condition decreases compare to those for non-yawed condition. Even if local angle of attack and the relative inflow velocity are the same condition, pressure distribution shows differences due to local slip angle. The tufts flows-visualization on the rotating blade was carried out by setting the video camera on the rotating system. By the observation of tufts behavior, the reduction of normal force coefficient is mainly caused by the separation.

Experimental Study on Flow around Blades of Horizontal Axis Wind Turbine in Wind Tunnel (2nd Report Studies on the flow around blade based on pressure distribution), Takao MAEDA, Yasunari KAMADA, Yusaku SAKAI and Naoki TAKAHARA: Transaction of JSME, Series B, Vol.71, No. 705, pp. 1383-1389, 2005.

This paper describes the results of the surface pressure measurements on a wind turbine rotor and the velocity measurements around the rotating blade. The experiments are carried out in a wind tunnel with a 2.4m diameter three-bladed wind turbine. The pressure taps are set at 31 positions in each of four test sections. Four radial sections at r/R=0.3, 0.5, 0.7 and 0.85 are selected for the measurements. The pressure distributions are measured for both rotating and non-rotating situation. These pressure distributions are compared and used for detecting the angle of attack for the rotating blade. The pressure distribution at r/R>0.7 shows the good agreements between rotating and non-rotating situation. The pressure distribution for the inner part of r/R<0.5 shows the stall delay. Also, by using the angle of attack estimated from the pressure distribution and the velocity distribution, the representative point for the relative velocity to the blade section is discussed. The angle of attack is compared with the designed value by the blade elements momentum theory.

Effect of wind Shear on Characteristics of Rotating Blade of Field Horizontal Axis Wind Turbine, Hideyuki KAWABUCHI and Takao MAEDA: Transaction of JSME, Series B, Vol.71, No. 708, pp. 2075-2082, 2005.

This paper shows the aerodynamic characteristics at 50% radial section on rotor blade of 10m-diameter wind turbine is exposed to wind shear. A sonic wind speed meter and six cup anemometers are installed 1D upwind of the turbine in order to measure wind profiles. The anemometers at the top, middle and bottom levels are installed at a height of 18.3, 13.3 and 8.3 meters respectively, which correspond with the height of tip at blade top position, hub height, and tip at blade bottom position, respectively. As the results of the measurement, the normal force coefficient in strong wind shear condition decreases compared to those for weak wind shear condition. Even if local angle of attack is almost same condition, the normal force coefficient shows differences due to hysteresis effect. Especially, influence is large when not only a height direction but also a horizontal direction has strong wind shear. A remarkable difference appears in the pressure distribution at that condition.

Surface Pressure Measurement on a Rotating Blade of Field Horizontal Axis Wind Turbine in Yawed Condition, Takao MAEDA and Hideyuki KAWABUCHI, JSME International Journal Series B, Vol. 48, No. 1, pp.156-163, 2005.

This paper shows the pressure distribution at the 50%radial section of a rotor blade of 10m-diameter wind turbine in yawed operation. The pressure sensors were mounted on the blade, and local inflow angle and local dynamic pressure were measured with the use of five hole Pitot tubes at 1 chord length upwind of the blade leading edge. It was found that the normal force coefficient in yawed condition decreases compared to that for non-yawed condition. Even if local angle of attack and the relative inflow velocity are the same, pressure distribution shows differences due to the local slip angle. The tufts flow-visualization on the rotating blade was carried out by setting a video camera on the rotating system. Separation in the region of middle chord to trailing edge on suction surface is thought to be the main reason of the reduction of normal force coefficients.

Surface Pressure Distribution on a Blade of a 10 m Diameter HAWT (Field Measurements versus Wind Tunnel Measurements), T. Maeda, E. Ismaili, H. Kawabuchi, and Y. Kamada, Journal of Solar Energy Engineering, Vol. 127-2, pp. 185-191, 2005.

This paper exploits blade surface pressure data acquired by testing a three-bladed upwind turbine operating in the field. Data were collected for a rotor blade at spanwise 0.7R with the rotor disc at zero yaw. Then, for the same blade, surface pressure data were acquired by testing in a wind tunnel. Analyses compared aerodynamic forces and

surface pressure distributions under field conditions against analogous baseline data acquired from the wind tunnel data. The results show that aerodynamic performance of the section 70%, for local angle of attack below static stall, is similar for free stream and wind tunnel conditions and resemblances those commonly observed on two-dimensional aerofoils near stall. For post-stall flow, it is presumed that the exhibited differences are attributes of the differences on the Reynolds numbers at which the experiments were conducted.

Development studies on a horizontal axis wind turbine with micro passive pitch-flap mechanism, Takao MAEDA, Yasunari KAMADA, Takayuki KATO and Hiroshi TAMURA: WIND ENERGY, Vol. 29, No3, pp. 81-84, 2005.

The performance of micro passive pitch-flap mechanism is experimentally evaluated. The micro passive mechanism uses the aerodynamic thrust and centrifugal force to activate the pitch motion for suppressing the rotor torque incase of high wind speed condition. The tests are performed in the wind tunnel and the filed test site. As result of measurements, the mechanism can suppress the both over power and over rotational speed in high wind condition.

Measurement of Wake behind Horizontal Axis Wind Turbine, Takao Maeda, Yasunari Kamada, Tsutomu Kakinaga and Keita Nakano: Proceedings of International Conference On Jets, Wakes and Separated Flows, ICJWSF-2005, pp. 519-524, 2005.

The wake of Horizontal Axis Wind Turbine rotor was studied with both wind tunnel and field measurements. The detail measurements were carried out in the wind tunnel with Pitot tube array, and particle image velocimetry (PIV). The field measurements were carried out with cup anemometers and wind vane for 10-m diameter rotor. From the wind tunnel measurement, the wake was expanded from the position where the tip vortex was dissipated. The wake velocity behind field wind turbine was recovered in shorter distance than that for the wind tunnel measurement. The wake area was shifted toward radial direction in rotational plane related to wind turbine rotational direction. The wake velocity below rotor axis was not much recovered by the effect of tower compared to those above rotor axis.

Experimental Study on a 100kW Wind Turbine, Takao MAEDA, Yasunari KAMADA, Ismaili EDMOND: Proceedings of EXPO WCWRF 2005, CD-ROM, p.4, 2005.

This research work was performed under a special coordination fund from the Japanese Ministry of science and education, as part of a project intended as a realistic demonstration of the coexistence and compliment of multi renewable energy sources for remote and rural applications. As part of this project, a 100kW test wind turbine is erected in Mie University experimental farm. Diameter of the wind turbine is 20m and the hub height is 30m. The wind turbine is connected to the grid via a AC-DC-AC converter system. The wind speed was measured upstream the wind turbine by a supersonic meter. In this study the performance of the experimental wind turbine is evaluated for different experimental configurations, and a large amount of data has been obtained in wind speeds averaging up to 13m/s. In addition, the velocity distribution downstream of the wind turbine was measured by the Doppler SODAR .

Relationship between Wind Profile and Terrain Configuration, Takao MAEDA, Yasunari KAMADA, Bo Yang, Ismaili EDMOND: Proceedings of EXPO WCWRF 2005, CD-ROM, p.4, 2005.

Traditionally, as a routine procedure, the measurement of the wind speed for wind energy purposes, such as site assessment, has been performed with the use of cup anemometers mounted at the top of masts. The wind speed at

hub height is estimated using power law based on the observational data obtained from the anemometers. In this paper a new method of determining the power law index taking into consideration the effect of the topographical features of the terrain, is presented. The boundary layer distribution using the new power law index is compared with the distribution obtained by the least square method. A difference less than 5% is found, which makes the new power law index very useful in estimating accurately the wind speed up to hub height.

Numerical Analysis on Performance Prediction of Horizontal Axis Wind Turbine, Takao MAEDA, Yasunari KAMADA, Ismaili EDMOND, Koma ARIGA: Proceedings of EXPO WCWRF 2005, CD-ROM, p.4, 2005.

The aerodynamic characteristics of wind turbines are closely related to the geometry of their blade airfoil sections. The innovation and the technological development of wind turbine blades airfoil sections can be classified in two groups: Improvement of the existing blade profiles and Design of new shapes of blades in order to achieve better aerodynamic characteristics. Though in recent years there has been substantial progress in the aerodynamic modeling and design of horizontal axis wind turbine, there is still a failure to accurately predict high aerodynamic loads. Attention is focused in developing CFD codes that accurately predict the performance of the wind turbine blade. This paper presents a comparative evaluation of the numerical results obtained from CFD method and experimental results obtained in the wind tunnel. The flow around rotor blade was analyzed by the CFD method and the performance of a wind turbine was predicted. The turbulence models, SST model, k-ε model, low-Reynolds number k-ε model, were used in this CFD. The predictor accuracy and problems raised with CFD modeling are discussed.

Studies on small scale woody biomass gasification system, Yasunari KAMADA, Norio WATANABE*, Takao MAEDA, Ismaili EDMOND: Proceedings of WCWRF2005, CD-ROM, p.4, 2005.

This research work is performed as part of a project intended as a realistic demonstration of the coexistence and compliment of multi renewable energy sources for remote and rural applications. In this way the project should contribute to the securing reliable power sources and ongoing reduction of CO_2. As part of the project, a small-scale woody biomass generating plant is developed. In this paper, the experimental results of a small scale reactor are presented. A real time monitoring of the temperatures and pressures (suction level) inside the reactor was recorded. Air was supplied through pipe systems from the top of the reactor, and the suction inside the reactor was controlled through a variable speed suction fan. At a first stage, the gas production from woody biomass in the small-scale reactor was achieved. The reactor control by suction fan was evaluated. The starting and stopping process were tested.

Development of a micro gate-type hydroelectric generation system(A Study of Active Gate System), Takao MAEDA, Yasunari KAMADA, Ismaili EDMOND, Yoichi YAMADA: Proceedings of WCWRF2005, CD-ROM, p.4, 2005.

Developing of alternate environmental friendly energy resources becomes an imperative in energy and environment crisis appearing on the horizon. The hydropower has long been used worldwide and is well known for its benefits. At the same time, utilization of large hydropower plants is blaming for the impact on the flora and fauna, and climate change as well. In this study, the authors propose a micro-generation system that makes use of streams and it does not need a large water head. The co-existence with aqua life passing through the gate is also investigated. In this study, an active gate system was developed and evaluated. The relationships between the performance of the system, flow rate, motor rotating speed, interval of opening and shutting of the gate have been investigated experimentally.

Relation between Surface Pressure Distribution and Coriolis Acceleration on Rotating Blade of Field Horizontal Axis Wind Turbine, Takao Maeda, Hideyuki Kawabuchi : Proceedings of The 6th KSME-JSME Thermal and fluids Engineering Conference, CD-ROM, DA.02, p.4, 2005.

In this paper are shown the surface pressure distributions acquired by testing a three-bladed upwind turbine operating in the field. Data were collected at 90% spanwise section with the rotor disc at zero yaw. Inflow velocity and inflow angle to the rotating blade is changed due to non-uniformity and unsteadiness in the field. A spanwise velocity component become large when local slip angle becomes large, since a circumferential velocity is large especially at 90% radius section. It seems that a certain influence of the Coriolis acceleration appears on the surface pressure distributions, since the spanwise flow on the blade surface is curved by the Coriolis force. The estimated Coriolis acceleration on the blade surface was found to be about ten times the gravity acceleration. By examining the relations between the Coriolis acceleration and the surface pressure distributions on the rotating blade, it became clear that the normal force coefficient decreased with increasing the Coriolis acceleration at the local angle of attack by which the stall delay begins to be observed.

Development of nosecone wind turbine in diffuser casing, Takao Maeda, Yasunari Kamada, Hiroshi Tamura : Proceedings of International Symposium on Eco Topia Scince 2005 Joind with IFSS-Nagoya05, pp. 87-88 , 2005.

Recently, the wind turbine installation has concentrated on the mountainous region where wind potential is superior, because the power output of the wind turbine is in proportion to the third power of the wind velocity. The city part has a fatal fault with low average wind velocity. If the wind can be accelerated effectively, it is possible to obtain the output power that can be practicably used. Then, we take diffuser as acceleration method. Diffuser enables acceleration by effect of sucking out that using a late internal flow and a fast external flow. In addition, it is effective to use in the city part, for the reason why safety can be secured because there is not exposing the rotor outside. The experiments are carried out with a wind tunnel. These measurements are performed with changing the open angle by equated entrance area of diffuser and exit area. Moreover, the shape of wind turbine boss part and nacelle part was aerodynamically changed to improve the performance. It was not researched so far. In addition, Diffuser surrounding flow was visualized with Particle Image Velocimetry (PIV).

Measurement of pressure distribution on oscillating airfoil, Takao Maeda, Yasunari Kamada, Shingo Suzuki: Proceedings of International Symposium on Eco Topia Scince 2005 Joind with IFSS-Nagoya05, pp. 83-84, 2005.

Generally, the airfoil characteristic in static condition where the angle of attack doesn’t change in time is used for development of wind turbines blade. However, under the unsteady wind condition in which wind turbines is operated, wind velocity and a wind direction change continuously and angle of attack for airfoils of wind turbines blade is changed with large amplitude. Therefore, the airfoils for development of wind turbines blade requires high performance in wide range of angle of attack and consideration for the dynamic state of changing in time. The airfoil characteristic in static condition depends on the profile and Reynolds number, angle of attack, but in a dynamic state, it depends on rotational center and attack angle change speed, attack angle change range in addition to them.

Study of pressure distribution on a rotor blade of field horizontal axis wind turbine, Takao MAEDA, Yasunari KAMADA, Takashi SATO, Takashi KONDO: Proceedings of the 54th JSME tokai branch annual meeting, No. 053-1,

pp. 253-254, 2005.

This paper shows the experimental study on the field HAWT rotor aerodynamics. The 10m-diameeter test wind turbine is used for this study. The inflow wind conditions are measured by the cup type anemometers and 3 component sonic anemometer. The aerodynamic performance on the rotating blade is measured by the surface pressure distribution. The relation between rotor yaw angle and sectional aerodynamic forces is shown.

Numerical analysis on performance prediction of horizontal axis wind turbine, Takao MAEDA, Yasunari KAMADA, Hiroaki ITO: Proceedings of the 54th JSME tokai branch annual meeting, No. 053-1, pp. 259-260, 2005.

This paper describes the numerical analysis on the rotor blade. In this study, two types turbulence model, k-e and SST are evaluated with the experimental data. As the results, the SST model shows the better accuracy to estimate the aerodynamic force act on the rotating blade.

Studies on pressure distribution on the field wind turbine blade, Takao MAEDA, Yasunari KAMADA, Takashi KONDO, Kei TANAKA: proceedings of the 10th National Symposium on Power and Energy Systems (SPES 2005) pp. 71-72, 2005.

This report is a study to relate to pressure distribution on a field horizontal axis wind turbine. We were able to confirm that a dynamic stall occurred in a wind turbine glade by doing this study. An angle of attack－Normal force coefficient, Tangential force coefficient curve pictured a hysteria loop by a dynamic stall, but we cleared the change of Normal force coefficient is uncertain and Tangential fore efficient pictures counterclockwise.

Studies on small scale generation plant by woody biomass gasification, Yasunari KAMADA, Takao MAEDA, Norio WATANABE*, Edmond ISMAILI: proceedings of the 10th National Symposium on Power and Energy Systems (SPES 2005) pp. 225-226, 2005.

This report describes the experimental results of a small-scale generation plant by woody biomass gasification. The gasification reactor is a fixed floor type. The diameter of roaster is 0.5m. A small gasification plant was tested with woody pellet. In the experiment multi point temperatures, pressures flow rates were measured. The details of data are shown in the paper.

Studies on pressure distribution on the field wind turbine blade, Takao MAEDA, Yasunari KAMADA, Takashi KONDO, Kei TANAKA: Proceeding of JSME annual meeting 2005(MECJ-05), Vol.2, pp. 243-244, 2005.

This paper shows the experimental tests for the pressure distribution on the rotating wind turbine blade. The detail comparison between the field rotor test and the wind tunnel test is shown for the several azimuth angle and yaw angle. The diameter of field rotor is 10m and that of wind tunnel one is 2.4m. the Ct, Cn curve, shows differences between the field rotor test and the wind tunnel test. It seems that these differences caused by the effect of the atmospheric turbulence and rotational effect.

Relationship Observed wind Profile by Doppler SODAR and Terrain Configuration, Takao MAEDA, Yasunari KAMADA, Keita NAKANO, Tsutomu KAKINAGA: Proceedings of the 27th wind energy symposium, pp. 253-256, 2005.

For siting the wind park, the wind condition is the most important problem. To evaluate the wind characteristics at site , the measuring mast with anemometer is used. The height of mast is not the same as the rotor axis, so the wind speed at the rotor height is estimated with the atmospheric boundary layer profile. The vertical profile of the wind speed is highly depends on the terrain configuration. In this study the vertical profiles of the wind speed is measured by the Doppler SODAR at many sites and the relationships between terrain configuration and profiles are

discussed. As the result, the new profile parameter with the terrain configuration is proposed.

Hydrogen Energy by Water Electrolysis Using Fluctuation of Wind Power Electricity, Katsuya SASAKI*, Kenji SUGINO*, Takao MAEDA: Proceedings of the 27th wind energy symposium, pp. 161-164, 2005.

The experimental evaluation for the hydrogen production device is carried out with the 100kW filed test wind turbine. The output power of the wind turbines is not stable because of the fluctuation of the wind speed and direction. This fluctuation gives the difficulty to use the wind turbine as a local power plant. To solve this disadvantage, the author thought that the hydrogen production device could be use as the energy storage. As the result of experiment, the system performances are discussed.

Study of pressure distribution on a rotor blade of wind turbine, Takao MAEDA, Yasunari KAMADA, Hideyasu FUJIOKA: Proceedings of Fluids Engineering Conference 2005, CD-ROM, p.4, 2005.

This paper shows the experimental studies on the rotating blade of wind turbine in yaw inflow condition. The aerodynamic performance of the rotor blade is measured by the surface pressure measurement. The test is carried out in the wind tunnel. As the result, the relation between the yaw angle and power coefficient are shown. Furthermore, the blade sectional performance for 0.7R are discussed with the pressure distribution and the aerodynamic force coefficient.

Ultrasonic Computerized Tomography (CT) for Temperature Measurements with Limited Projection Data Based on Extrapolated Filtered Back Projection (FBP) Method, Ning Zhu*, Yong Jiang* and Seizo Kato: Energy, Vol.30, pp.509-522, 2005

This study uses ultrasound in combination with tomography to obtain three-dimensional temperature measurements using projection data obtained from limited projection angle. The main feature of the new computerized tomography (CT) reconstruction algorithm is to employ extrapolation scheme to make up for the incomplete projection data, it is based on the conventional filtered back projection (FBP) method while on top of that taking into account the correlation between the projection data and Fourier transformed-based extrapolation. Computer simulation is conducted to verify the above algorithm. An experimental 3D temperature distribution measurement is also carried out to validate the proposed algorithm. The simulation and experimental results demonstrate that the extrapolated FBP CT algorithm is highly effective in dealing with projection data from limited projection angle.

Analysis and Assessment of Environmental Load of Vending Machines by a LCA Method, and Eco-Improvement Effect, Yukio Kimura*, Yucho Sadamichi, Naoki Maruyama and Seizo Kato: Trans. of the JSRAE, Vol.22, No.1, pp.45-54, 2005

These days the environmental impact due to vending machines' (VM) diffusion has greatly been discussed. This paper describes the numerical evaluation of the environmental impact by using the LCA (Life Cycle Assessment) scheme and then proposes eco-improvements' strategy toward environmentally conscious products (ECP). A new objective and universal consolidated method for the LCA-evaluation, so-called LCA-NETS (Numerical Eco-load Total Standardization) developed by the authors is applied to the present issue. As a result, the environmental loads at the 5years' operation and the material procurement stages are found to dominate others over the life cycle. Further eco-improvement is realized by following the order of the LCA-NETS magnitude; namely, energy saving, materials reducing, parts' re-using, and replacing with low environmental load material. Above all, parts' re-using is specially

recommendable for significant reduction of the environmental loads toward ECP.

Life Cycle Analytical Tools and Externalities of the Fuel Gas Desulphurization System in Thailand, Sate Sampattagul, Seizo Kato, Tanongkiat Kiatsiriroat* and Anugerah Widiyanto: Chiang Mai University Journal, Vol.4, No.1, pp.1-17, 2005

The Flue Gas Desulphurization (FGD) system has been employed at Thailand's biggest lignite-fired power plant to reduce the large amount of SO_2 emission. In order to understand ecological and economic resolutions, the lignite-fired plant was studied both before and after the installation of the FGD. The focus of this study was to consider not only the Life Cycle Assessment (LCA) outcome but also the Life Cycle Costing (LCC) factors. The results can provide valuable information when selecting appropriate technologies to minimize the negative impact that lignite-fired power plants have on the environment. The Life Cycle Assessment – Numerical Eco-load Total Standardization (LCA-NETS) was used to evaluate the impact on the environment of both the lignite-fired plant and the FGD. Life Cycle Costing (LCC) was used to provide a comparison between alternatives before and after installation of FGD. The externalities model was designed to study the relationship of the life cycle environmental impacts and life cycle cost values. The results of the study are shown in the eco-load values over the entire life cycle of the lignite-fired plant which indicates that the installation of the FGD system can reduce the acidification problem, associated with lignite-fired plants, by approximately 97%. The LCC estimation shows the major costs of the FGD system: capital investment, operation and maintenance and miscellaneous costs. The externalities provide the decision-making information when considering the cost of the FGD system in terms of protecting the environment.

LCA Analysis and Evaluation of Fuel and Power Plant System (in Japanese), Seizo Kato, Yucho Sadamichi: Journal of the Japan Institute of Energy, Vol. 84, No. 3, pp.186-188, 2005

Environmental Impact Consolidated Evaluation of Energy Systems by an LCA-NETS Scheme, Seizo Kato and Anugerah Widiyanto: Energy, Vol. 30, pp.2057-2072, 2005

The issue of LCA environmental impacts produced from energy systems is presently being discussed; they are directly involved in fossil fuel depletion, global warming, air pollution, rain acidification, etc. In evaluating various kinds of energy systems from the lack concept, an identical standard measure is to be introduced, as there are many different causes for generating environmental loads to the environment and the respective causes have their respective characteristics. Consequently, the authors have proposed an integrated scheme called the ESS (Eco-load Standardization Scheme) to express the amount of environmental load from different causes, using an identical standard based on objective data. That is a 'Loader-Receiver Tolerant Balance Theory', which indicates the balance of the maximum tolerance value that the Loader can discharge or consume with the maximum tolerable value by the Receiver. This ESS employs the NETS (Numerical Eco-load Total Standard) as the unit for expressing quantitatively the integrated and standardized environmental load. This LCA-NETS scheme is applied to different energy systems such as various kinds of power plants and co-generation systems, and the LCA evaluations are discussed for further ecological improvement.

Environmental Impact Assessment from Operating Co-generation Systems and Power Plants, Naoki Maruyama, Yucho Sadamichi, Anugerah Widiyanto and Seizo Kato: Proceedings of 3rd International Energy Conversion Engineering Conference, CD-ROM, 2005

The issue of the environmental effect of energy system is presently being discussed; they are directly involved in global environmental problems. Design methodology of environmentally conscious products (ECP) or well known as design for environment (DfE) is the methodology usually followed to enhance the environmental performance. In addition, the life cycle assessment (LCA) is found to be a suitable method and a powerful tool for evaluating the environmental impacts numerically resulting from the activity through the lifecycle. The purpose of this paper is first to discuss the implementation of environmental management system (EMS) and its evaluation of environmental compatibility for power plants in the design phase. The energy flow and the environmental impacts numerically of distributed power supplies for a non-utility installation are analyzed, especially for hotels, office buildings, hospitals and houses. The LCA scheme is applied to the specified co-generation energy systems consisting of gas turbines, wasted heat boilers, steam absorption refrigerators and heat exchangers. The environmental impacts of the power generation system are shown, and then minimizing the impacts on environment due to the CGS operation. The results of this study could be useful as recommendation for the further development of sustainable eco-energy supply systems.

Influence of Photocatalyst Film Forming Conditions on CO_2 Reforming, Akira Nishimura, Nobumasa Sugiura, Mitsumasa Fujita, Seizo Kato and Shinji Kato*: Proceedings of 3rd International Energy Conversion Engineering Conference, CD-ROM, 2005

Photocatalyst can reform CO_2 into fuel-like species of CO, CH_4, C_2H_4 and C_2H_6. However, the amount of product by reforming is still low as it is reported that the reforming concentration of product is from 100 to 10000 ppmV. In this paper, we apply TiO_2, which is the best photocatalyst, film coated on Cu substrate by a sol-gel and dip-coating method. To promote reforming performance of TiO_2 film, the influence of photocatalyst film forming conditions, which are coating number of TiO_2 film, firing duration time, and amount of TiO_2 in one layer of film, on CO_2 reforming has been investigated. Additionally, the relationship between reforming performance and film surface characteristic has been examined. As a result, the reforming performance of TiO_2 film is promoted with increasing coating number and prolonging firing duration time thanks to expansion of film surface area and increase in activity point. It is necessary to adjust the amount of TiO_2 in one layer of film according to coating number for obtaining a high performance of TiO_2.

LCA-NETS Evaluation for GHG of Power Generation Plants in Thailand, Sate Sampattagul, Seizo Kato, Naoki Maruyama, Akira Nishimura, Tanongkiat Kiatsiriroat* and Anugerah Widiyanto: Proceedings of 2nd International Conference on Life Cycle Management, 2005

The research indicates the life cycle assessment (LCA) results of greenhouse gas emissions from grid-mixed

system power generation plants in Thailand. The purpose is to understand the characteristics of these systems from the viewpoint of global warming. The objective of this LCA research is to identify the environmental impacts of electricity generating from grid-mixed electric systems in Thailand. In the paper, the LC-GHG emission per kWh of electricity generated was estimated for the power generation systems using a combined method of process analysis and input-output analysis. The results of study are based on information obtained from the Electricity Generating Authority of Thailand (EGAT) and two of independent Power Producers (IPP). The sensitivity analysis of the impacts of emerging, future and uncertainties associated with some assumptions are examined to help clarifying interpretation of the results.

Life Cycle Analysis and Assessment of Vending Machines, and their Eco-Improvement, Yukio Kimura*, Sate Sampattagul, Yucho Sadamichi, Akira Nishimura, Naoki Maruyama and Seizo Kato: Proceedings of 2nd International Conference on Life Cycle Management, 2005

Vending machines are indispensable for life in Japan. The number of vending machines operated in this country in the year 2004 is about 5.55 million sets and annually consuming electricity of 0.7% of Japan's annual domestic power generation. This social fact requires us to analyze and estimate the environmental impacts of vending machines numerically and then to concretely improve them to reduce environmental stress. In the method of Life Cycle Assessment (LCA), as an environmentally based tool for Environmentally Conscious Products (EPS), & Life Cycle Management (LCM) material depletion have been found to be occupying a large part of environmental load and "reuse" is an effective method from the combined environmental and economic viewpoint. Moreover, recovery of refrigerant and the best selection of materials are the other strong measures as well.

Study on Temperature Measurement by Using Ultrasonic Wave, Yoshitaka Maeda, Akira Nishimura, Naoki Maruyama and Seizo Kato: Proceedings of the 12th Tri-University International Joint Seminar & Symposium 2005, pp.181-184, 2005

The temperature measurement is one of the important measurements in the industrial and engineering field. In general, the temperature can be measured by the temperature sensor contacting the object. However, when we measure the temperature in vessel, the temperature sensor disturbs the fluid flow in the vessel. Additionally, there is a fear of the damage of the temperature sensor when the temperature sensor is inserted in a high temperature or high acidic field. Furthermore, this method can measure the local temperature only. An ultrasonic wave is a good candidate for temperature measurement technique not to disturb the fluid flow since the temperature in the vessel can be measured from the outside of wall vessel. The purpose of this study is to establish the temperature measurement systems that uses ultrasonic wave. As the first stage in this study, the uniform temperature water in aluminum circular pipe was measured though the final purpose of this study is to measure the temperature distribution of the water that flows in the aluminum pipe. As a result, the temperature obtained by ultrasonic wave has good agreement with the temperature obtained by the thermocouple under the uniform temperature distribution in the aluminum circular pipe. It has been obvious experimentally that the temperature measurement method which uses ultrasonic wave can measure the temperature of the entire measurement field including inside of the vessel.

Evaluation of Traffic Congested Alleviation by the Restriction of Vehicles, Masaki Fukuchi, Akira Nishimura, Naoki Maruyama and Seizo Kato: Proceedings of the 12th Tri-University International Joint Seminar & Symposium 2005, pp.228-231, 2005

Nowadays, the vehicles are essential to people and can transport goods at high speed. However, an increase of the vehicle contributes to CO_2 emission exhausted from the vehicles and becomes a serious problem. Especially, CO_2 emission increases when the traffic congestion occurred. Moreover, the traffic congestion obstructs the urgent vehicle when the disaster occurred. Therefore, the traffic congested solution can decrease CO_2 emission and smooth the flow of the vehicles. In this study, we have been constructed the model that can evaluate the traffic congestion. As the result, we were evaluated the CO_2 emission, which reduced by the restriction of vehicles.

Development of Recycling Evaluation Index by Using Life Cycle Assessment, Ryuma Ito, Yucho Sadamichi, Sate Sampattagul, Naoki Maruyama, Akira Nishimura and Seizo Kato: Proceedings of the 12th Tri-University International Joint Seminar & Symposium 2005, pp.232-235, 2005

Recycling is paid attention as a tool to solve the environmental problems. However, a lot of recycling methods do not consider the life cycle environmental impacts that are generated in the other stage of life cycle in the recycling process. According to this problem, it can contribute to the environmental impact in the recycling process, too. Therefore, it is necessary to construct the environmental assessment technique of recycling, and to remove recycling that depraves environmental problems. In this paper, first of all, the evaluation technique of the environmental load that the person involved in the recycling process causes is constructed. Next, the evaluation technique that evaluates how much the material is used effectively by recycling is constructed. When the former is evaluated, the idea of LCIA (Life Cycle Impact Assessment) is taken and a potential environmental impact is evaluated. And when the latter is evaluated, the data of demand is used to. Finally, the recycling of the iron used for most industrial products is evaluated by the constructed index. And, the validity of the index is evaluated.

Design Methodology for Environmentally Conscious Energy Systems, Naoki Maruyama, Yucho Sadamichi, Sate Sampattagul and Seizo Kato: Proceedings of the 12th Tri-University International Joint Seminar & Symposium 2005, pp.257-260, 2005

Design methodology of environmentally conscious products or well known as design for environment is the methodology usually followed to enhance the environmental performance. In addition, the life cycle assessment is found to be a suitable method and a powerful tool for evaluating the environmental impacts numerically resulting from the activity through the lifecycle. The purpose of this paper is first to discuss the implementation of environmental management system and its evaluation of environmental compatibility for power plants in the design phase. Then the LCA is applied to different power generation systems and the environmental impacts of the systems are shown. The results of this study could be useful as recommendation for the further development of sustainable eco-energy supply

systems.

Producing Fuel from CO_2 by Photocatalyst –Investigation on improvement method of reforming concentration– (in Japanese), Akira Nishimura, Nobumasa Fujita, Mitsumasa Fujita, Seizo Kato and Shinji Kato*: Proceedings of SCEJ 70th Annual Meeting, CD-ROM, 2005

Optimization of Under-floor Flows to Aim at Drag and Lift Compatible Reduction of Large Commercial Vehicles –Control of Flow Fields around Wheels- (in Japanese), Masaya Tanimura, Yasushi Kato and Seizo Kato: Proceedings of 2005 JSME Annual Congress, No.68-05, pp.19-22, 2005

Larger aerodynamic drag due to the wake is loaded on large commercial vehicles running with high-speed to long distance. In this study, wind tunnel tests are performed by using a 1/16-bus model on a moving ground with the purpose of its drag and lift simultaneous reduction. The flow field around wheels is investigated, and the optimum flow is realized by installing aero-devices. As a result, drag and lift simultaneous reduction is realized by controlling the under-floor flow around wheels with the aid of aero-devices.

Environmental Impact Assessment from Operating Co-generation Systems and Power Plants, Naoki Maruyama, Yucho Sadamichi, Anugerah Widiyanto and Seizo Kato: Proceedings of 42nd National Heat Transfer Symposium of Japan, Vol.2, pp.321-322, 2005

A Life Cycle Assessment (LCA) scheme is applied to the specific gas turbine co-generation energy systems, and then minimizing the impacts on environment during the operation. The technique assesses the environmental aspects and potential impacts throughout a product's or system life. This evaluation method is able to treat the global and regional environmental issues such as the depletion of natural resources and global warming due to CO_2 emissions, etc. Fuel is also optional from oil, natural gas, and another types of fuels. The efficiencies of the respective machines are to be inputted as functions of energy demands. The electricity and heat hourly demands are estimated from the statistical data of living energy demands depending mainly on the floor spaces for the case study. The results of this study could be useful as recommendation for the further development of sustainable eco-energy supply systems.

Influence of Photocatalyst Film Forming Conditions on CO_2 Reforming, Akira Nishimura, Nobumasa Sugiura, Mitsumasa Fujita, Seizo Kato and Shinji Kato*: Proceedings of 42nd National Heat Transfer Symposium of Japan, Vol.2, pp.323-324, 2005

To promote photocatalytic reforming of CO_2 into fuel-like species of CO, CH_4, C_2H_4 and C_2H_6, the influence of photocatalyst film forming conditions, which are the number of photocatalyst film coating, firing duration time in the coating process, and the amount of photocatalyst in one coating film, on the reforming performance has been investigated. Photocatalyst film is formed on copper substrate by sol-gel and dip coating method in this study. As a

result, CO_2 reforming performance of photocatalyst is improved with increasing the number of photocatalyst film coating and the amount of photocatalyst in film. These reaction promotions are obtained by increasing reaction points and reaction surface area.

An Approach Integrating Life Cycle Assessment and Costing Model for Eco-Industrial Product (in Japanese), Yoshiyuki Izu, Naoki Maruyama, Yucho Sadamichi, Seizo Kato, Sate Sampattagul, Akira Nishimura, Ryuma Ito, Yukio Kimura* and Masaki Nakamura*: Proceedings of 2005 Symposium on Environmental Engineering, pp.133-136, 2005

Life Cycle Assessment (LCA) becomes a more critical tool for ECP (Environmentally Conscious Products) designing. At the same time, Life Cycle Costing (LCC) and Environmental Accounting (Eco-Accounting) are becoming a necessary tool to make design of WTP (willingness to pay) for avoiding certain environmental impacts. This paper proposes a conversion scheme of the environmental load reduction expressed in physical units due to countermeasures into money units based on the CO_2 emission dealing right price, which is able to be evaluated by the CO_2 equivalent NETS values. Additionally, several criteria for the environmental costs performance are proposed with case studies.

Gate to Gate Life Cycle Evaluation of Industrial Products for Eco-Production Development (in Japanese), Yuki Yamaoka, Naoki Maruyama, Yucho Sadamichi, Seizo Kato, Akira Nishimura, Yukio Kimura* and Nobuhiro Watanabe*: Proceedings of 2005 Symposium on Environmental Engineering, pp.137-140, 2005

Life Cycle Assessment (LCA) has been greatly paid attention to its effectiveness in evaluating environmental loads through the life cycle of any industrial products. The LCA method has been used to analyze the environmental loads of the processes. This paper focuses on the LCA evaluation at the manufacturing phase, especially at painting-coating process and plastic-injection process molding process. The various kinds of the inventory data of the processes are collected by measuring respective parameters. The objective of this study is to evaluate the LCA environmental loads in these two manufacturing processes based on the data analysis. It is recommended to use the here Numerical Eco-load Standard values in order to design the Eco-products.

Study on Heat Transfer Characteristics of Natural Convection in the State of Low-density Environments, Masanori Yoshimoto, Naoki Maruyama, Hirokazu Matsui and Seizo Kato: Proceedings of Thermal Engineering Conference ’05, No.05-17, pp.371-372, 2005

The object of this study is to evaluate the heat transfer characteristics in low-density environments, where the pressure is given between high vacuum region and atmospheric pressure. In this study, a natural convection, affects the field of production of thin films, is analyzed by experiment using holographic interferometry. In addition, by comparing the results of the experiments, the effectiveness of numerical calculation is tested of low-density environments. After that, the various conditions are analyzed by numerical calculation instead of experiment. Finally, the characteristics of

heat transfer are evaluated by two kinds of analyses.

A study on two phase flow of hypochlorous water in narrow and parallel plate with high efficiency (in Japanese), Kazuya Kato, Naoki Maruyama, Takahiro Tatumi and Seizo Kato: Proceedings of Thermal Engineering Conference '05, No.05-17, pp.381-382, 2005

Gas and liquid two phase flow in narrow and parallel plate is investigated by experiment and numerical simulation. The experiment is performed in batch and fluid type, where the gas is generated during the experiment by chemical reactions. The purpose of this paper is to create the chlorination water considering from the standpoint of high concentration and high efficiency. These result will be applied to create the chlorination water called hypochlorous acid with high efficiency.

Life Cycle Analysis and Assessment of Vending Machines, and their Eco-Improvement (in Japanese), Yukio Kimura*, Yucho Sadamichi, Akira Nishimura, Naoki Maruyama and Seizo Kato: Proceedings of 1st LCA Conference of Japan, pp.30-31, 2005

Design for Environmentally Friendly Processing in the Manufacturing Stage of Industrial Products –Metal Processing, Plastic Injection Modeling, Painting Process- (in Lapanese), Yucho Sadamichi, Yuki Yamaoka, Naoki Maruyama, Akira Nishimura, Seizo Kato, Yukio Kimura*, Masaaki Nakamura* and Nobuhiro Watanabe*: Proceedings of 1st LCA Conference of Japan, pp.118-119, 2005

Studies on Mixing Process and Performance Improvement of Jet Pump (Effects of Nozzle and Throat Shapes), Yukitaka YAMAZAKI, Atsushi YAMAZAKI, Tadashi NARABAYASHI*, Junya SUZUKI* and Toshihiko SHAKOUCHI, Transaction of the Japan Society of Mechanical Engineers, 70-701 B, pp.147-153, 2005.

A Study of Performance of Jet Pump (Effect of Configuration of Flow Passage), Yukitaka YAMAZAKI, Atsushi YAMAZAKI, Tadashi NARABAYASHI*, Junya SUZUKI* and Toshihiko SHAKOUCHI, Proc. of the Sixth World Conference on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics, ExHFT-6, CD-ROM, 2005.

Gas-Particle Two-Phase Jet Flow from Slot Nozzle and Micro-Blasting Process, Masaki SUGIMOTO, Toshihiko SHAKOUCHI, Kohei HAYAKAWA and Moriyasu IZAWA*, Transaction of the Japan Society of Mechanical Engineers, 70-710 B, pp.2450-2457, 2005.

Research on Stability of Fishing Bank made by Large Particle Size Porous Concrete placed under Sea (Experiment using large scale waterway), Akihiro MAEGAWA, Toshihiko SHAKOUCHI, Yukihisa YUASA*, Naoki MISHIMA* and Shigemitsu HATANAKA, AIJ J. Technol. Des., 22, pp.53-58, 2005.

Flow Analysis for Single and Multi-nozzle Jet Pump, Tadashi NARABAYASHI*, Yukitaka YAMAZAKI, Hidetoshi KOBAYASHI* and Toshihiko SHAKOUCHI, Proc. of the International Conference on Jets, Wakes and Separated Flows, ICJWSF-2005, pp.267-272, 2005.

Flow and Control of Vertical Upward Gas-Liquid Two-Phase Flow Through Sudden Contraction Pipe, Alexandros VOUTSINAS, Toshihiko SHAKOUCHI, Koichi TSUJIMOTO and Toshitake ANDO, Proc. of the ICJWSF-2005, pp.307-312, 2005.

Flow and Heat Transfer Characteristics of High Temperature Gas-Particle Air Jet Flow, Hirokazu NAKAMURA and Toshihiko SHAKOUCHI, Proc. of the ICJWSF-2005, pp.307-312, 2005.

Particle Laden Impinging Jet Flow from Rectangular Nozzle and Abrasive Jet Machining, Masaki SUGIMOTO, Toshihiko SHAKOUCHI, Kohei HAYAKAWA, Motoki OKAZAKI and Moriyasu IZAWA*, Proc. of the ICJWSF-2005, pp.325-330, 2005.

Effect of Surface Roughness on Jet Pump Performance, Yukitaka YAMAZAKI, Tomonori NAKAYAMA, Tadashi NARABAYASHI*, Hidetoshi KOBAYASHI* and Toshihiko SHAKOUCHI, Proc. of the ICJWSF- 2005, pp.491-495, 2005.

Flow Analysis for Single and Multi-Nozzle Jet Pump, Tadashi NARABAYASHI*, Yukitaka YAMAZAKI, Hidetoshi KOBAYASHI* and Toshihiko SHAKOUCHI, Proc. of the ICJWSF-2005, pp.267-272, 2005.

Direct Numerical Simulation of Jet Mixing Control Using Combined Jets, Koichi TSUJIMOTO, Toshihiko SHAKOUCHI, Shuji SASAZAKI and Toshitake ANDO, Proc. of the ICJWSF-2005, pp.725-730, 2005.

To develop efficient method of jet mixing, direct numerical simulations of combined jets are carried out. The Reynolds number is defined with a nozzle diameter, is Re=1500. The spatial discretization is performed with hybrid scheme in which sixth order compact scheme in streamwise direction and Fourier series in cross section are adopted. The distance between two jets is fixed at 6 times jet diameter, and the inclination angle of jet is changed from 45 to 70 deg. As a result, it reveals that the turbulence intensity is strengthened with decreasing inclination angle, and that the jet width increases via the excitation of jets. These findings suggest that the combination of jets flexibly meet the diversified needs of jet mixing control.

Direct Numerical Simulation of Mixing by Two Inclined Jets, Koichi Tsujimoto, Shuji Sasazaki and Toshihiko Shakouchi, Proc. of the 4th Int. Conf. on Computational Heat and Mass Transfer, pp.1268-1271, 2005.

To develop efficient method of jet mixing, direct numerical simulations of two inclined jets are carried out. The Reynolds number is defined with a nozzle diameter, is Re=1500. The spatial discretization is performed with

hybrid scheme in which sixth order compact scheme in streamwise direction and Fourier series in cross section are adopted. The distance between two jets is fixed at 6 times jet diameter, and the inclination angle of jet is changed from 45 to 70 deg. As a results, it reveals that the turbulence intensity is strengthened with a decreasing inclination angle, and that the jet width increases via the excitation of each jets. These findings suggest that the combination of jets flexibly meet the diversified needs of jet mixing control.