
The 1-loop corrected decay widths of sparticles (charginos, neutralinos, gluino and sfermions) in the framework of the MSSM are calculated systematically using GRACE/SUSY-loop, which is the program package for the automatic calculation of the MSSM amplitudes in the 1-loop order. We present the renormalization scheme used in our system and show some numerical results of decay widths of sfermions and gluino using the SPS1a' parameter set and other SUSY parameter sets.


Existence of GZK neutrinos (ultra high energy neutrinos) have been justified although the flux is very low. A new method is desired to use a huge mass of a detector medium to detect them. A fundamental study of radar method was carried out to measure microwave reflection from electromagnetic energy deposit by X-ray irradiation in a small rock salt sample. The reflection rate of $1 \times 10^{-6}$ was found at the energy deposit of $1 \times 10^{19}$ eV which was proportional to square of the X-ray intensity suggesting the effect to be coherent scattering. The decay time of the reflection was several seconds. This effect implies a large scale natural rock salt formation could be utilized like a bubble chamber irradiated by radio wave instead of visible light to detect GZK neutrinos.

From an uneasy social environment and the climate change, electric vehicles (EVs) are gaining attention as the next important transportation system of the automotive society. The range, cost and life time limitations of battery are gradually being overcome. In the next stage of spread of EV, establishment of an appropriate EV infrastructure is expected. Although a commuter EV is recharged at home in general as for automakers plan, customers wish to recharge their EV at anytime for security. This study investigates an appropriate allocation of EV rechargers in Musashino city. We define the priority order among EV recharger candidates by comparing with a Voronoi diagram and the priority order circular diagram. Both diagrams are represented by the segmentation from specific town information. The outcome of this approach will result in a blueprint for implementing infrastructure to support electric transportation and will provide standards and guidelines to install the appropriate equipment for residential and fleet EV customers.
Effective strategies for us to win in Kendo match is investigated in the framework of the game theory. We analyze questionnaires for experts in Kendo club and list up some typical strategies. The computer simulation for the virtual match among them is performed. As a result, we found that strategies with the high performance are characterized by variety of techniques.

This paper proposes a strategy for appropriate installation of electric vehicle recharger. We define the priority order among EV recharger candidates by comparing with a Voronoi diagram and the priority order circular diagram. Both diagrams are segmented by specific town information. The outcome of this approach will result in a base plan for implementing infrastructure of electric vehicle and will provide standards and guidelines to install the equipment.

This report reviews on the topics of the recent Smart Grid technologies and the worldwide trend. The American Recovery and Reinvestment Act 2009 influences in the development, applications, products, manufacturers, and trends in the deployment of the Smart Grid in the United States and around the world. An “Intelligent” or “smart” grid will provide improved service reliability and more stable electric rates at a lower cost. This can be lower than simply building all the infrastructure that would be required to meet future demand for electricity using the current electric utility business model. The report provides a comprehensive analysis of the current market for smart grid enabling technologies and projects future market. The report also profiles major manufacturers and marketers of smart grid technologies and the strategies.

We numerically studied the atomic-scale friction of the monolayer graphene sheet during the nanoscale peeling process by molecular mechanics simulation. The zigzag behavior appears twice in the force curve during the surface and line contacts between the graphene sheet and the graphite surface. During the surface contact, the graphene sheet takes the atomic-scale sliding motion, which exhibits the transition from the continuous to the stick-slip sliding particularly for the graphene with the armchair-type free edge. The period of the zigzag structures for the stick-slip motion in the peeling force curve nearly corresponds to the lattice period of the graphite depending on the lattice orientation and the edge structure of graphene. During the line contact, the graphene sheet also takes the stick-slip sliding motion. Comparison between armchair- and zigzag-type free edges reveals the difference of the characteristic atomic-scale sliding of the graphene sheet. These findings indicate the possibility of not only the direct observation of the atomic-scale friction of the graphene sheet at the tip/surface interface but also the identification of the lattice orientation and the edge structure of the graphene sheet.

This paper theoretically discusses the nano-scale measurement. Model simulation of dynamic lat...
eral force microscopy (DFLM) regulated by scanning tunneling microscopy (STM) has been performed. The simulated STM/DFLM maps on Si(111)-7*7 exhibit marked transitions depending on the lateral dithering amplitude, and they can successfully reproduce the experimentally acquired maps for a wide range of operating conditions. This work describes the direct calibration of dithering amplitude-induced artifacts of STM/DFLM maps on Si(111)-7*7 for a small time-averaged tunneling current corresponding to a tip-sample distance larger than 5Å, where the atomic relaxation of the tip and the sample is sufficiently small.


This paper experimentally discusses the nanoscale adhesion. The adhesion and peeling of a multiwalled carbon nanotube (MWCNT) on a substrate have been studied. Nanoscale and mesoscale intermittent adhesion and peeling, and a conformational transition of an MWCNT appear in the vertical force-distance curve, which depends strongly on the length of the MWCNT, substrate, and velocities of adhesion and peeling. The elastic bending feature of the MWCNT as a nanospring appears during the adhesion and peeling.


This paper theoretically discusses the nanoscale friction. The scan-directional dependence of the superlubricity of a C60 molecular bearing system (graphite/C60/graphite interface) is studied and compared with that of a graphite system (graphite/graphite/graphite interface) by molecular mechanics simulation. The mean lateral force $\langle F_L \rangle$ reaches a maximum within a narrow region approximately in the [1010] direction. For


This paper experimentally discusses the nanoscale measurement. Lateral force gradient of down to 0.01 N/m on Si(111)-7*7 was directly detected by dynamic lateral-force microscopy with an amplitude of 81pm. Positive and negative torsional resonance frequency shifts of a silicon cantilever caused by the attractive interaction inward and outward tip ditherings were detected on adatom and nonadatom sites, respectively. The lateral force of down to subpiconewton was measurable with direct lateral force spectroscopy. The converted lateral force predicts a possibility of the stick-slip motion in the noncontact region. The theoretical calculations were in good qualitative agreement with the experiments.


This paper theoretically discusses the nanoscale friction. The scan-directional dependence of the superlubricity of a C60 molecular bearing system (graphite/C60/graphite interface) is studied and compared with that of a graphite system (graphite/graphite/graphite interface) by molecular mechanics simulation. The mean lateral force $\langle F_L \rangle$ reaches a maximum within a narrow region approximately in the [1010] direction. For
other regions, $<F_L>$ has a nearly constant value of less than 1 pN. In particular, in the [1230] direction, $<F_L>$ reaches a minimum of nearly zero. It is clarified that $<F_L>$ reflects the following types of C60 motion: sliding above the carbon bond and a discrete slip to the neighboring AB-stacking position. The load dependence of $<F_L>$ also exhibits marked anisotropy. The orders of magnitude of the simulated friction coefficients are comparable to those obtained in our previous experiments.


Adsorptive removal of tert-butanol (TBT), an odorant additive, from city gas was carried out using metal ion-exchange Y type zeolites at ambient temperature and pressure. The adsorption capacity of TBT on silver ion-exchange Y type zeolites (Ag(Na)Y) increased with higher silver ion-exchange ratio in Ag(Na)Y under wet gas condition. In contrast, the adsorption capacity of TBT on Ag(Na)Y under the dry gas condition unexpectedly decreased with higher silver ion-exchange ratio in Ag(Na)Y. Formation of silver sulfide clusters in Ag(Na)Y causes the decrease in sulfur adsorption capacity of it under the dry gas condition. The adsorption capacity of TBT on copper ion-exchange Y type zeolites (Cu(Na)Y) increased with higher copper ion-exchange ratio in Cu(Na)Y under wet gas condition. In the case of Cu(Na)Y, the decrease of TBT adsorption capacity under the dry gas condition did not occur with higher copper ion-exchange ratio in Cu(Na)Y.


Selective methaneation of CO in the reformate gas was performed over Ru catalysts supported on various metal oxides and zeolites at 150-300°C. Both the catalytic activity and selectivity were dependent on the support materials. In our experimental conditions, CO in the reformed gas (0.17%CO, 17.9%CO₂, 70.9%H₂ and 11.1%H₂O) was selectively converted to CH₄ at wide temperature ranges (200-275°C) over Ru/γ-Al₂O₃, Ru/TiO₂, Ru/H-Y zeolite and Ru/H-beta zeolite catalysts. An increase in Ru amount in Ru/TiO₂ catalyst increased both CO and CO₂ methanation rate and CO/CO₂ selectivity decreased considerably. On the other hand, the increase in Ru content in Ru/γ-Al₂O₃ enhanced the CO methanation activity and that hardly affected to the CO₂ methanation activity.


The Ag(I) complex with o-bis (diphenylphosphino) benzene shows reversible interconversion between blue-emitting (1b) and green-emitting (1g) materials on grinding and heating; comparison of the structure of 1b with another green-emmiting crystals (2) having the same formula suggests the chromism results from intermolecular interactions between adjacent phenylene rings.

Kenji Matsumoto, Takao Shindo, Naoki Mukasa, Toshiaki Tsukuda and Taro Tsubomura: “Luminescent Mononuclear Ag(I)–Bis(diphosphine) Complexes : Correlation between the Photophysics and the Structures of Mononuclear Ag(I)–Bis(diphosphine) Complexes”, Inorg. Chem., vol.49, No.3, pp 805–814,
The structural and spectroscopic properties of a Cu(I) complex bearing a methylene-linked bis(N-heterocyclic carbene) ligand, [Cu(µ-Me-bmbim)₂](PF₆)₂, were investigated. X-ray single crystal structure analysis revealed that the complex is binuclear similar to the corresponding silver(I) complex. In [Cu₂(µ-Me-bmbim)₃](PF₆)₂, cation−π interaction between copper and the adjacent carbene carbon is observed. On the other hand, the copper−copper interaction is very weak in the crystal and almost negligible in solution. The absorption spectrum of [Cu₂(µ-Me-bmbim)₃](PF₆)₂ in methanol shows a strong absorption band (ε = 23 000 dm³ mol⁻¹ cm⁻¹) and a weaker shoulder (ε = 6200 dm³ mol⁻¹ cm⁻¹) at 261 nm and 300 nm, respectively. From molecular orbital calculations using TD-DFT, these absorption bands are assigned to the metal-centered transitions with some contribution from the NHC orbitals. The powdered sample of [Cu₂(µ-Me-bmbim)₃](PF₆)₂ shows bright blue-green phosphorescence with a high quantum yield (43%). The phosphorescence is of dual-emission character at room temperature with peak maxima at 374 nm and 482 nm whereas it changes to a single emission band centered around 500 nm at 77 K. Molecular orbital calculations indicate that the luminescence derives from the triplet MC and MLCT mixed excited states. A methanolic solution of [Cu₂(µ-Me-bmbim)₃](PF₆)₂ shows yellow-green phosphorescence with a peak maximum at 542 nm. Unlike in the solid state, no dual-emission was observed. These results suggest that the dual emission is caused by differences in the contribution of metal−metal interactions at room temperature in the solid state. The differences in the absorption and emission properties between [Cu₃(µ-Me-bmbim)å](PF₆)₂ and the related Cu(I)−diphosphine complex, [Cu₂(µ-depm)₃] (BF₆)₂ are discussed.


Ayumi Dairiki, Toshiaki Tsukuda, Kenji Matsumoto and Taro Tsubomura: “Structure and emission properties of mixed-ligand Cu(I) complexes containing phosphinesulfide ligands”, Polyhedron, vol.28, No.13,
Mixed-ligand Cu(I) complexes containing phosphinesulfide ligands were synthesized, and the structure and emission properties were studied for the Cu(I) complexes. X-ray crystallographic study showed that a chelating phosphinesulfide and diimine are coordinated to Cu(I) center. Coordination geometry around Cu(I) center of each complex is described as a distorted tetrahedron. Some of the complexes show photoluminescence in the solid state.


The folding of glycoproteins is primarily mediated by a quality control system in the ER, in which UDP-Glc: glycoprotein glucosyltransferase (UGGT) serves as a “folding sensor”. In this system, client glycoproteins are delivered to UGGT after the trimming of their innermost glucose residue by glucosidase II, which releases them from the lectin-chaperones calnexin (CNX) and calreticulin (CRT). UGGT is inactive against folded proteins, allowing them to proceed to the Golgi apparatus for further processing to complex- or hybrid-type glycoforms. On the other hand, this enzyme efficiently glucosylates incompletely folded glycoproteins to monoglucosylated structures, providing them with an opportunity to interact with CNX/CRT. In order to clarify the mode of this enzyme’s substrate recognition, we conducted a structure-activity relationship study using a series of synthetic probes. The inhibitory activities of various glycans suggest that UGGT has a strong affinity for the core pentasaccharide (Man3GlcNAc2) of high-mannose-type glycans. Our comparison of the reactivity of acceptors that have been modified by various aglycons supports the hypothesis that UGGT recognizes the hydrophobic region of client glycoproteins. Moreover, we discovered fluorescently labeled substrates that will be valuable for highly sensitive detection of UGGT activity.


Glucosidase II (G-II) is a glycoprotein-processing enzyme that successively cleaves two alpha1,3-linked glucose residues from N-linked oligosaccharides in the endoplasmic reticulum (ER). G-II is a heterodimer whose alpha-subunit contains a glucosidase active site, but the function(s) of the beta-subunit remain poorly defined. We report here an in vivo enzymatic analysis using gene disruptants lacking either the G-II alpha or beta-subunit in the filamentous fungus Aspergillus oryzae. Using synthetic oligosaccharides as probes, G-II activity of the membranous fraction of the gene disruptants was investigated. The fraction lacking the beta-subunit retained hydrolytic activity toward p-nitrophenyl alpha-D-glucopyranoside, but was inactive toward both Glc(2)Man(9)GlcNAc(2) and Glc(1)Man(9)GlcNAc(2). When the fraction containing the beta-subunit was added to the one including the alpha-subunit, the glucosidase activity was restored. These results suggested that the beta-subunit confers the substrate specificity towards di- and monoglucosylated glycans on the glucose-trimming activity of the alpha-subunit.


During N-glycosylation of proteins, significant
amounts of free unconjugated glycans are also generated in the lumen of the endoplasmic reticulum (ER). These ER-derived free glycans are translocated into the cytosol by a putative transporter on the ER membrane for further processing. However, the molecular nature of the transporter remains to be determined. Here, we report the establishment of a novel assay method for free oligosaccharide transport from the ER lumen using chemically synthesized fluorescence-labeled N-glycan derivatives. In this method, fluorescence-labeled glycan substrates were encapsulated inside mouse liver microsomes, followed by incubation with the cytosol and a fluorescence-quenching agent (anti-fluorophore antibody). The rate of substrate efflux was then monitored in real time by the decrease in the fluorescence intensity. The present data clearly demonstrated that the oligosaccharide transport activity under the current assay conditions was both ATP and cytosol dependent. The transporter activity was also found to be glycan structure specific because free glucosylated glycans were unable to be transported out of the microsomes. This new assay method will be a useful tool for identifying the transporter protein on the ER membrane.


High-mannose-type oligosaccharides, which are cotranslationally introduced to nascent polypeptides during N-glycosylation, play critical roles in protein quality control. Involved in this process are a number of intracellular carbohydrate-recognizing proteins or carbohydrate-processing enzymes, including calnexin/calreticulin, malectin, glucosidase I (G-I) and II (G-II), UDP-glucose:glycoprotein glucosyltransferase (UGGT), cargo receptors (VIP36, ERGL, and ERGIC-53), ER 1,2-mannosidase I, ER de-
gradation-enhancing alpha-mannosidase-like proteins (EDEMs) and ubiquitin ligase. Although all these proteins seem to recognize high-mannose glycans, their precise specificities are yet to be clarified. In order to conduct quantitative evaluation of the activity and specificity of these proteins, a comprehensive set of high-mannose-type glycans and their variously functionalized derivatives were synthesized and used to analyze enzymes involved in glycoprotein quality control system.


Then the wavepacket gradually diffuses around the structure. This behavior has close relation to the dynamical properties of electrons in the structure, e.g., the conductivity, the magnetic resistance etc. The quantum fidelity, which can measure the robustness of dynamical states inside the nanostructures, is also discussed.

The time-evolution of the wavepacket inside chaotic and integrable two-dimensional (2D) nanostructures is numerically studied. We have found the enhancement around the classical periodic orbits during the time-evolution in the stadium billiard. It is similar to the scars in the standing wave of the chaotic billiards. The initial position and velocity, and the shape of the wave packet are crucial for the enhancement, but we can observe that the remnant of the initial wave packet travels along the unstable periodic orbit.

The purpose of this paper is to propose a statistical method for determining minimum detectable values in pulse-counting measurements, "Analytical Sciences", Vol. 26, 259-265, 2010.2


The purpose of this paper is to propose a statistical method for determining minimum detectable values in pulse-counting measurements.
ments. The output of x-ray, electron and ion-spectroscopy detectors is a series of pulses that vary in their arrival frequency according to a Poisson distribution. The analysis presented here relates this to a Normal distribution, making it consistent with the standards and methodology recommended by IUPAC and in the ISO11843 series of international standards. The theory and limitations of doing this are presented using two types of approximation: the Simple approximation and the Square Root approximation. Variance, critical values of the response variables, capability of detection criteria and the minimum detectable values are then defined. Finally, the validity of the approximations is checked using experimental data. It is concluded that the methodology is accurate enough for practical use.


Many people have been interested in Web 2.0, which is a new concept of Web service. Web sites became sources of information and functionality that enables users to create new content of their own. For this demand, more versatile browsers that enables users to edit and display content based on their creative concepts and preferences are required. Motivated by this demand, we have developed a state-transition diagram-based Web
browser programming scheme that supports participatory Web use and enables end-user to interact with Web content. We implemented a prototype of our scheme called GUEST (Graphical User Interface Editor by State-transition Diagram). GUEST enables users to define behaviors of a Web browser easily. However, there are some parts of complexity of user interfaces that prevent the users' intuitive understanding in the original version of GUEST. Therefore, in this paper, we focus on user interface, and introduce a new concept of the design.


The recent spread of broadband Internet access, speeding up of JavaScript in Web browsers, and development of communications technology such as Ajax have led to the development of a variety of Web applications. The access congestion of Web servers and lower usability in the case of frequent requests are the major problems that affect the use of Web applications. In this study, we investigate the bottlenecks in single server systems and propose a technique to improve the usability of Web-based MORPG servers.


The design and demonstration results for a campus-scale wavelength routing network test bed are described. 4K digital cinema contents are successfully transmitted over the test bed network via 8 wavelengths GbE interfaces to verify the feasibility of the network.

The authors have been developing a strong migration mobile agent system in Java. Using the system, we are developing the platform of an autonomous distributed processing system, called AgentSphere. In this research, a mechanism so that an agent can create a backup of itself which includes data in the middle of execution is implemented. In order to use this mechanism, a user describes backup commands in the agent's code. The backed-up agent is sent into other AgentSphere. And when an original agent stops according to an unexpected situation, the backed-up agent will start its activity instead of original one in order to resume its processing. Moreover, the method to insert backup commands automatically in suitable positions of an agent's code is proposed. Furthermore, this paper also describes the implementation of a scheduler which performs initial distribution of agents and the communication functions between agents in AgentSphere.
Authors have developed a strong migration mobile agent system using Java. In order to make strong migration possible on usual JVM, we have already proposed an automatic code transformation method for such agents. In this paper, in order to apply this strong migration mobile agent system to autonomic distributed processing, the system, called AgentSphere, which offers the space where agents can be active is proposed. Agents can perform their processing by entering into AgentSphere on any machine. AgentSphere consists of the core systems and the subsystems which support an agent's activities. As some of the core systems, a class loader which updates class files dynamically with agents' migration and the communication facility among AgentSpheres are designed and implemented. Moreover, as one of the subsystems, a virtual file system for autonomic distributed processing is implemented using out mobile agents.

Kazuhiko Saito, Hiroko Midorikawa, Munenori Kai:

64-bit OSの普及により、飛躍的に大きなアドレス空間が利用可能となった。筆者らはローカル物理メモリサイズに制限されず、クラスターの各ノードの遠距離メモリを集めて仮想的に大容量メモリを逐次処理用に提供するシステム、分散大容量メモリシステム DLMを提案してきた。DLMは、OSスラップシステムに組み込む他の多くの遠隔ページング手法とは異なり、OS のスラップシステムとは独立にユーザレベルソフトウェアとして実装されている。すでに、汎用TCPのみを用いたDLMが、ブロックデバイス構築、専用NIC、低レベル通信プロトコルなどを併用した上述の手法に比べ、より高い性能と動作安定性を示すことを明らかにしてきた。本論文では、従来のDLMでTCP/IP等に基づく専用通信プロトコルで実装してきたノード間通信機構を、標準的なクラスター間通信機構であるMPIで実装し、より移植性が高く最先端の高性能通信機構にも対応した、遠隔メモリ利用による高速大容量メモリを提供する。これにより、従来はクラスタに限られなかった、大容量データを扱う逐次処理応用を持つユーザが、並列プログラミングの知識なしに、MPIベースシステムで運用される多くのオープンクラスタを、メモリ資源として利用することが可能になった。Myri10G/Bonding4 のネットワークを持つオープンクラスタでの実験では、遠隔メモリバンド幅613MB/sを達成し、241GBのデータに対するHimenoベンチマーク処理を20GBメモリノードを複数用いて、稼働できることを示した。またNPBの6種のプログラムについて、ローカル/遠隔メモリサイズ比と性能の関係などについて明らかにした。
本研究では、点数の増加とともに、提案法の計算時間は従来法と同程度になることも示した。


邦文題目: 陰関数とDelaunay分割による法線なし3次元離散点データからの境界面推定法

入力データとして3次元物体表面上の節点座標情報のみが与えられたとき、境界面を推定する方法を提案する。本方法では、まず、節点座標に対するDelaunay分割によって大まかに境界面を予想する。その後、同境界面を利用して陰関数を生成するための制約節点を配置し、陰関数を生成する。この陰関数から推定される境界面の精度は不十分な可能性があるが、再度Delaunay分割と陰関数を利用することで推定境界面を修正し、精度を上げることも可能である。数値実験では、提案法によって境界面が徐々に修正されていくことを例示した。また、推定された境界面は、与えられた節点上において高精度であることも示した。

K.Hatakeyama, Y.Osana and S.Kuribayashi: “Reducing total energy consumption with collaboration between network and end systems”, NBiS2009, Session 7B, 2009.8

邦文題目: ネットワークとサーバの連携によるトータル電力使用量の削減方式

Full-scale IT introduction in the near future is expected to increase information flows vastly and this information explosion will also increase the number of IT devices in use, positioning the energy consumption of IT devices themselves as a key issue. Most of conventional measures to treat energy consumption handle servers and network devices separately. This paper first identifies that the network should cooperate with end systems to reduce the total energy consumption, and proposes an integrated method to reduce the total energy consumption by both network and end systems. Then, this paper proposes a simple method of estimating the volume of energy consumption by all network devices and assigning it to an individual user, based on the volume of traffic measured and the information about packet routing paths in the network.


邦文題目: ユーザが広告を選択可能なテレビ広告配信方式

People watch television unconstrained by time or location and receive TV programs from different type of media. Under these circumstances, it could be necessary to reconsider the conventional advertising model based on an audience rating.

In this paper, a new TV advertising model, in which users select their favorite commercial from multiple commercials before they watch a pro-
茂木美智子・栗林伸也：「レッドタクトン技術を用いたテレビ電力消費量削減方式の提案」成蹊大学理工学研究報告Vol.46, No.1, pp.47-49, 2009

地球温暖化問題への関心が内外において急速に高まっており、その対策として徹底した省エネルギーの推進が求められている。家庭で消費される電力量が多い家庭製品はエアコン、冷蔵庫、照明、テレビであることが知られている。この中で、人がいなくても点けっぱなしにしている可能性が高く、消費電力が多いのはテレビ、エアコンである。エアコンはサーモスタットやタイマー機能が使われることが多く、無駄な使用を防ぐ手段はある。

本研究では、テレビに注目し、利用者の面倒な操作なしに電力消費量を大幅に削減する方法を提案している。具体的には、レッドタクトン技術を利用し、利用者がテレビの設定を変える部屋から出たことを自動認識し、利用者操作なしにテレビを映像オフまたは待機モードに自動的に切り替えるものである。また、来客者やペットが居ても利用者を特定して操作を実施できる。これにより、映像オフで良い時間が全体の1/4であればテレビの電力消費量をトータルで約2割程度削減できることも示した。

長名保範・栗林伸也：「ネットワークとサーバの連携によるトータル電力使用量削減を実現する接続信号シーケンスの提案」 成蹊大学理工学研究報告Vol.46, No.2, pp.107-111, 2009

情報通信機器ならびにネットワーク機器の電力使用量の大幅な増大が今後想定され、その削減は重要な課題である。従来は、サーバとネットワーク機器の電力使用量削減策は個別に検討されがちだった。本論文では、サーバなどのエンドシステム側とネットワーク側で連携することによりトータルの電力使用量を大幅に削減できる可能性を示し、その連携を実現するために必要な情報とその交換のための接続信号シーケンスを明らかにしている。

邦文題目：復号画像からのモスキートノイズ推定

With DCT coding, block artifact and mosquito noise degradations appear in decoded pictures. The control of post filtering is important to reduce degradations without causing side effects. Decoding information is useful, if the filter is inside or close to the encoder; however, it is difficult to control with independent post filtering, such as in a display. In this case, control requires the estimation of the artifact from only the decoded picture. In this work, we describe an estimation method that determines the mosquito noise block and level. In this method, the ratio of spatial activity is taken between the mosquito block and the neighboring flat block. We test the proposed method using the reconstructed pictures which are coded with different quantization scales. We recognize that the results are mostly reasonable with the different quantizations.


MPEGなどの動画像符号化で必要な１ビクチャは符号量が多く、符号化効率の改善が望まれている。そこで、フレーム間処理で量子化誤差を軽減する処理を１ビクチャに適用する手法を提案する。処理制御方法及びパラメータについて検討し、実験結果から画像全体でPSNRを最大1.6dB程改善できた。

Alireza GoudarziNemati and Makoto Takizawa： “Data Transmission Procedure for a Multi-Source Streaming Model in Mobile Peer-to-Peer Overlay
In peer-to-peer (P2P) overlay networks, multimedia contents are in nature distributed to peers by downloading and caching. Here, a peer which transmits a multimedia content and a peer which receives the multimedia content are referred to as source and receiver peers, respectively. A peer is realized in a process of a computer and there are mobile and fixed types of computers. A peer on a mobile computer moves in the network. Furthermore, a peer maybe realized as a mobile agent. Thus, not only receiver peers but also source peers might move in the network. In this paper, we would like to discuss how source peers deliver multimedia contents to receiver peers in a streaming model so that enough quality of service (QoS) required is supported in change of QoS of network and peer, possibly according to the movements of the peers. In this paper, we discuss a multi-source streaming (MSS) protocol where a receiver peer can receive packets of a multimedia content from multiple source peers which can support enough QoS. If a current source peer is expected to support lower QoS than required, another source peer takes over the source peer and starts sending packets of the multimedia content. The receiver peer is required to receive packets of the multimedia content with enough QoS, e.g., no packet loss even if the source peer is being switched with a new source peer. We discuss how to switch source peers so as to support enough QoS to the moving receiver peer. We evaluate the MSS protocol in terms of the fault ratio, i.e., how frequently the receiver peer fails to receive packets with enough QoS and show the MSS protocol can reduce the fault ratio.


Ensuring anonymity in wireless and hoc networks is a major security goal. Using traffic analysis, the attacker can compromise the network functionality by correlating data flow patterns to event locations/active areas. In this paper we present a novel Scalable Anonymous Protocol that hides the location of nodes and obscure the correlation between event zones and data flow from snooping adversaries. We quantify the anonymity strength of our protocol by introducing a new anonymity metric: Degree of Exposure Index. Our protocol is designed to offer flexible tradeoffs between degree of anonymity and communication delay overhead.


一四七一
It is widely recognised that distributed systems would greatly benefit from the availability of a generic failure detection service. In this paper, we highlighted the issue on the construction of the monitoring network of failure detectors. We proposed an algorithm to construct and manage the monitoring network that each failure detector is monitored by some failure detectors. Notification of failures is propagated along the network. Especially, it can involve various types of failure detectors from simple timeout-based failure detectors to accrual failure detectors, and help to spread information on suspected processes/nodes. In addition, we have made a simulation of the proposed algorithm for constructing the monitoring network. It shows that the algorithm is scalable for increasing the number of failure detectors.


Information systems have to be consistent and secure in presence of multiple conflicting transactions. The role-based access control (RBAC) model is widely used to keep information systems consistent and secure. A role shows a job function in an enterprise and is a set of access rights (permissions). Here, a subject s is allowed to issue a method op to an object o only if an access right <o, op> is included in the roles granted to the subject s. A subject is granted one or more than one role and issues a transaction to multiple objects. The transaction is assigned with some roles of the subject which is referred to as purpose. Even if every access request issued by every subject is authorized in the roles, illegal information flow might occur as well known confinement problem. In this paper, we define a legal information flow (LIF) relation \( R_1 \sqsubseteq \sqsubseteq R_2 \) among a pair of role families \( R_1 \) and \( R_2 \) to prevent illegal information flow. Here, an LIF relation \( R_1 \sqsubseteq \sqsubseteq R_2 \) shows that no illegal information flow occur if a transaction \( T_1 \) with a role family \( R_1 \) is performed prior to another transaction \( T_2 \) with a role family \( R_2 \). In addition, it is significant to discuss which transaction to be performed prior to another transaction if the both transactions manipulate the same object in a conflicting way. In this paper, we define a significantly precedent relation \( R_1 \sqsubseteq \sqsubseteq R_2 \) among role families \( R_1 \) and \( R_2 \) which implies that the role family \( R_2 \) is more significant than \( R_1 \).

Suppose a pair of transactions \( T_1 \) and \( T_2 \) with role families \( R_1 \) and \( R_2 \) issue conflicting methods \( opi \) and \( opz \), respectively, to an object o. If \( R_1 \sqsubseteq \sqsubseteq R_2 \), \( opz \) is performed on the object o prior to \( opi \). The more significant a transaction is, the more prior it is performed. We discuss a legal information flow (LIF) scheduler to synchronize transactions so as to prevent illegal information flow and to serialize conflicting methods from multiple transactions in terms of significance and information flow relations.
A transactional agent is a mobile agent to manipulate objects distributed on computers. A transactional agent can change a schedule to visit computers if some target computer is faulty. In order to reduce the communication overhead, a transactional agent is composed of routing and manipulation subagents. A routing subagent makes a decision on what computer to visit in presence of faults of computers. On arrival at the computer, the routing subagent loads classes of a manipulation subagent to locally manipulate objects. We evaluate the transactional agent model in terms of access time compared with the traditional client-server model.

Various types of applications manipulate objects distributed in Peer-to-Peer (P2P) overlay networks. It is critical to discuss which peer can manipulate an object in which method. First, an application has to find target peers which can manipulate an object. We newly take an acquaintance approach. An acquaintance peer of a peer p is a peer whose service the peer p knows and with which the peer p can directly communicate. We discuss types of acquaintance relations of peers with respect to what objects each peer holds, is allowed to manipulate, and can grant access rights on. Acquaintance peers of a peer may notify the peer of different information on target peers. Here, it is critical to discuss how much a peer trusts each acquaintance peer. We define the trustworthiness of each acquaintance peer in terms of the acquaintance relations among the peers. In addition, we discuss a Charge-Based Flooding (CBF) algorithm to find target peers so that more trustworthy areas in P2P overlay networks are more deeply searched. We evaluate the CBF algorithm compared with a traditional TTL-based flooding algorithm.

The vector clock widely used in group protocols cannot be adopted to a scalable group due to communication and computation overheads. In order to reduce the overheads, we discuss a hierarchical group which is composed of local subgroups. Processes in subgroups are synchronized by using physical and linear clocks while processes in a WAN are synchronized by using a vector clock. We discuss how to causally deliver messages by using the local synchronization mechanisms. We discuss how to reduce the number of messages to be unnecessarily ordered. We evaluate the protocol in terms of number of messages ordered.

In Peer-to-Peer (P2P) applications, peers exchange their opinions with each other and make an agreement on one opinion. Agreement process...
dures have to be so flexible that persons can change their opinions, withdraw previous opinions under some constraints on the opinions, and use various types of agreement conditions like majority-condition in our society. We discuss a flexible agreement protocol of multiple peers by taking into account human behaviours in a fully unstructured P2P system model. We discuss forward, backward, mining, and observation strategies to efficiently make agreement. We discuss how peers cooperate to take consistent strategies at each round.


Information systems are required to be not only secure but also consistent in presence of security threats and multiple conflicting transactions. The security and concurrency control are independently discussed like locking protocols and access controls. Role-based access control model is widely used in information system for security managements. In the role-based access control model, authorized access requests are specified in roles. A transaction issued by a subject granted roles is assigned with a subfamily of roles named purpose. However, illegal information flow among subjects through objects may occur even if every access request is authorized. In this paper, we discuss a novel synchronization protocol to make an information system both secure and consistent. Based on the purpose concept, we discuss a purpose marking (PM) protocol to prevent illegal information flow to occur by performing conflicting transactions in a serializable way. We also show no illegal information flow occur in the PM protocol and how many transactions are aborted to prevent illegal information flow.


In peer-to-peer (P2P) overlay networks, source peers holding multimedia objects can transmit multimedia objects to receiver peers. A multimedia object is realized in a sequence of object units (OUs) which are units of transmission at the P2P overlay layer. In this paper, we discuss parallel types of multi-source streaming (PMSS) models where a receiver peer can concurrently receive object units of a multimedia object from multiple source peers which can support enough quality of service (QoS). The receiver peer is required to receive object units of the multimedia object with enough QoS, e.g. no object unit loss. Multiple source peers in parallel send object units to a receiver peer. In this paper, each object unit is delivered to the receiver peer so that there is no gap and time to buffer the object unit is reduced. In addition, object units are duplicated by sending parity units of the object units. Here, the receiver peer can deliver every object unit even if some object unit is lost. Since the lost object unit can be recovered from the parity unit and the other object units. We evaluate the PMSS model in terms of loss ratio of object units, buffering time, and gap time between consecutive object units in presence of network fault.


This paper presents design and implementation of a collaborative system, called Decentralised Synchronous Collaboration (DSC), based on a pure P2P architecture without using any server at all. It relies on group agents located on peers’
computers to coordinate group as well as peer management, and provides a message handler to deal with the correct message passing directly among group peers. DSC is implemented using JXTA technology that includes virtual JXTA networks, a set of standard protocols and basic services to let peers finding each other, forming groups, and exchanging messages across firewalls and Network Address Translators (NATs).


A transactional agent (TA) is a mobile agent which manipulates objects in multiple object servers with some constraints. For example, in a majority constraint, a transaction can commit if objects in more than half of the servers are successfully manipulated. An agent leaves a surrogate agent on a server on leaving the server in order to hold objects manipulated by the agent. A surrogate agent recreates an agent if the agent is faulty. We discuss how TAs with types of constraints can commit. We discuss implementation and evaluation of TAs for multiple servers.


In the graying society, it is important to monitor health-related bio-signal with sensors in the living environment for the sake of emergency response and long-term health management. In order to use bio-signal data monitoring systems daily at home, non-invasive monitoring and system maintenance are crucial. We propose a method of estimating the sleep stages of sleeping subjects through non-invasive measurement of heartbeat and respiration using a pneumatic method and an air mattress. However, the method incurs maintenance for periodically refilling the air of the mattress. In this paper, another pneumatic method, which uses an air tube made of the silicon rubber instead of the air mattress, is proposed. The change in S/N ratio in heartbeat and respiration signals, under greater background noise, are compared for the following: in a room with wooden flooring; in a room with tatami mats; in a bathtub; and in a lavatory. The results show that both the heartbeat and respiration can be measured with the S/N ratio of around 30 dB, and the signal of each heartbeat can also be confirmed provided the maximum background noise in the room with wooden flooring, in the room with tatami mats, in the bathtub, and in the lavatory are 0.1 m/s², 0.9 m/s², 100 ml/s, and 0.1 m/s², respectively.

Given the circumstances, the Ministry of Health, Labour and Welfare has established the standards for the activities and exercises for promoting the health, and quantitatively determined the exercise intensity on 107 items of activities.

This exercise intensity, however, requires recording the type and the duration of the activity to be calculated. In this paper, the exercise intensities are surmised using 3D accelerometer while the subjects are walking and running. As the result, the exercise intensities were surmised to be within the root mean square error of 1.2[METs] for walking and 3.2[METs] for running respectively.

In the rehabilitation of dysphagia patients,
judging the swallow ability and understanding its process are essential. Appropriate rehabilitation policies and dietary menus can then be selected to prevent aspirations. Currently, however, the swallow ability is mainly judged using large-scale and expensive methods such as video fluoroscopic examination of swallowing, Mesopharynx Fiber, Palatal Pressure Measurements, CT, and Cine MRI, which are difficult to be used in the houses of the patients. This paper proposes a swallow ability judgment system that applies photo sensors, which is handily used at home. As parameters to judge the swallow ability, the lead time, geniohyoid muscle, and thyrohyoid muscle are estimated using photo sensors with a little invasiveness. The results of estimation were obtained with the errors of only 12.5%, 19.2%, and 11.6%, for the lead time, the muscle strength of geniohyoid muscle, and the muscle strength of thyrohyoid muscle respectively. Then, we define a estimation equation to calculate the swallow age, corresponding to the age of the patient, to be used as an index to summarily estimate the swallow ability. The result of the estimation of swallow age showed the root mean square error between the calculated values and the actual ages of the patients was 6.89 years.


In this article we present a parameterized model for generating multimodal behavior based on cultural heuristics. To this end, a multimodal corpus analysis of human interactions in two cultures serves as the empirical basis for the modeling endeavor. Integrating the results from this empirical study with a well-established theory of cultural dimensions, it becomes feasible to generate culture-specific multimodal behavior in embodied agents by giving evidence for the cultural background of the agent. Two sample applications are presented that make use of the model and are designed to be applied in the area of coaching intercultural communication.


Embodied Conversational Agents (ECAs) are computer generated humanlike characters that interact with human users in face-to-face conversations. ECA is a powerful tool in representing the differences in cultural aspects and suitable for interactive training or edutainment systems. This paper presents the preliminary results of the development of a culture adaptive virtual tour guide agent for serving Japanese, Croatian and general western users by displaying of appropriate verbal and non-verbal behaviors. It is being implemented in Generic ECA Framework, a modulized programming framework for developing ECAs. By dividing ECA functions to reusable and loosely coupled modules, minimum efforts are required and it is supposed easy to incrementally scale up the system.


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ような環境での線構成の最適化を目的に、①発生する情報量、②情報発生源の移動性、③必要なネットワーク帯域、④処理時間、⑤情報品質をパラメータに、発生する情報量の定式化を試みた。

邦文題目：急峻なカット特性のFIR低域フィルタ設計手法

デジタルフィルタの設計では、特に大きなダイナミックレンジ特性が必要な場合、その設計手法は複雑になり、その結果計算容量は膨大になり、ハードウェア設計でも問題になる。本論文では、Fourier級数に基づいた従来手法に、フーリエシエンシや信号を用いたフィルタ設計法を開発、急峻なCut-Off特性のFIRフィルタを例にとってその具体例を示した。また処理も従来法に比べ、大きく減少させることも示した。

K. Hirano, Y. In, M. Kitazume, M. Higuchi, S. Kawasaki, H. Murakami: “Method of Event Location Iden-
tification Using GPS and Cam_whra Function of Mobile
Phones”, WSEAS TRANSACTION on INFORMATION SCIENCE and APPLICATIONS, issue 11, Volume 6, 2009.11
邦文題目：携帯電話のGPSとカメラを用いた位置検出法

携帯電話のGPSは今後さらに我々の生活に欠かす社会インフラになる。このGPS特性は、専用機GPSに比べ、測定条件の悪いGPS衛星が見えにくい環境でも優れた特性を示すが、平均的に必ずしも正確な位置特性を示すとは言えない。詳細な測定を長時間行った結果、約100％の確率で100m以内の誤差であることを示した。そこで携帯電話カメラを用い、事前に取得してある動画画像データベースと静止画カメラ画像間のマッチングをとることで、GPS単独より、大幅な誤差改善が可能であることを示した。

邦文題目：ノイズ分散とARパラメータの逐次推定

定常白色ガウス雑音が重畳された確率過程での、AR(autoregressive)パラメータ推定問題について新しい解決法を提案する。ここでは、逐次Yule-Walkerに基づき逐次推定法を用いた。提案手法を従来手法（subspace法）と比較実験を行い、提案手法が優れていることを示した。

邦文題目：e ラーニングによる生産設計と生産技術領域における PLM 教育

These days more attention is being paid to Product Lifecycle Management (PLM) using a technique for managing total product planning, design, manufacturing, sales, and disposal. We researched business processes and education curriculum of the PLM system in manufacturing businesses. We designed and developed the curriculum of PLM education and conducted part of a lesson. Most importantly, e-Learning is shown to be an effective tool for achieving educational objectives. We found that not only knowledge and theory but also practical education methods using case studies in an e-Learning environment are necessary for human resources to develop effective PLM.

邦文題目：自動販売機製造における作業系統設計のための WS-BOM データベースとデジタル作業標準書の提案
The standard time method has many techniques in production design. In the production plan and the line design, standard time is very important. We studied standard work for the case of assembly operation in a vending machine production line. The work system design and the workstation layout design were made into a technique by structuring the operation method and the operation time. In this paper, we propose the construction of a Work Station-Bill Of Materials (WS-BOM), that is the work standard data base system and the digital operation instruction sheet in the work system design.

エレクトロメカニクス学科


三冷却周をかけて測定を実施した。HTS配線の电流特性は冷却周数によって異る。したがって、今回は全ての冷却周数において測定を行った。なお、電気特性が動特性の測定時に制御パラメータの調整をスムーズに行うために、PCの入力画面機能を活用しやすい設定を考慮した。これにより、ロボット特性における周波数特性の「主にH、ノルム制約、安定余裕」に対する制御パラメータの可視性を可視的に表現し、さらに重ね合わせることで最適な制御パラメータ領域を導き出し可視的に表現できるパラメータ空間を構築する方法を提案している。


Three cooling cycles were carried out to measure the properties on the cable. Critical current of HTS tapes in the cable was measured at every cooling cycle and showed the similar temperature dependence; conclusively, the HTS tapes suffered no damage after cooling and heating process between each cycle. Peltier current leads were partly installed in the test stand, and it was measured that the temperatures of the feedthrough near to the liquid nitrogen were decreased in spite of a current feeding.


麝文題目：超伝導磁気エネルギー貯蔵装置用電磁力平衡コイルの7 T下におけるクエンチ特性

Force-balanced coil (FBC) is helically wound hybrid coil of toroidal field coils and a solenoid. The FBC can significantly reduce the required mass of the structure for induced electromagnetic forces. Based on the FBC design, a superconducting model coil has been developed. The outer diameter of the model FBC is 0.53m. The model FBC will have 270kW magnetic energy with the critical magnetic field of 7.1T. The critical coil current and self-inductance are 552A and 1.8H, respectively. The hand-made winding, using NbTi/Cu composite strands with a diameter of 1.17mm, was finished with 10584 poloidal turns after four months. The helical windings of the
model FBC were neither impregnated with epoxy resin nor reinforced with stainless steel wires. Three test runs were conducted with liquid helium cooling at intervals of several months. The number of quench test was 81 in total. In the third test run, the quench position of the FBC winding was identified using acoustic emission measurements. The first quench was 293A, which was 53% of the critical coil current. The training phenomena could be observed even after the coil was warmed up to room temperature. After successive quenches the quench current was improved to 476A, corresponding to 86% of the critical coil current, and it was successfully exited up to 6.1T.

The paths the pedestrians traveled were recorded and, when noise was not emitted, tended to be relatively straight, terminating at the parametric speaker location. However, when white noise was emitted, pedestrian paths tended to swerve in the direction opposite the white noise source, which was sometimes directly away from the sound guidance. These remarkable deviations from the guidance occurred more often when the parametric speaker was used than when the conventional speaker was used.

大倉元宏・中川幸士・城内博：「GHS対応に向けた視覚障害者に対する化学品の危険有機性情報の伝達に関する調査研究－面接調査による現状と課題の把握－」労働科学, 85(4), pp.155-166, 2009.11

Study on How to Transmit Information on Hazardous Chemical Products to Visually Impaired Persons as Part of Implementing the Globally Harmonized System of Classification and Labeling of Chemicals: Interview Survey on Current States and Issues

Because most visually impaired persons will occasionally need to purchase and use chemical products, it is vital that proper attention be given to ensuring that all pertinent information on hazards related to such products are made available to them by implementing the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). In this study, we attempted to clarify the current status of GHS implementation and identify important related issues by interviewing 84 visually impaired persons and collecting data on factors such as how often they use hazardous chemical products in their daily lives, whether they can identify and comprehend the intended meanings of currently used GHS hazard symbols, what media they prefer to use when investigating product information. Our results indicate that it is necessary to expand the information options available to visually impaired persons such as new information technologies and products, the Internet, audiotapes, large printed characters, Braille. This will allow such persons to select the media that best corresponds to their preferences and usage ability.

小方博之・山本紳恵子：「動作時系列データからのスキルの自動評価の一試み」日本テスト学会誌, Vol. 4, No. 1, pp. 65-72, 2008.5

Though performance testing is an effective way to assess examinees' skill in sports or manufacturing, its CBT implementation is not progressing. Taking golf putt swing as an example, this paper discusses a method to assess the skill level of an
examinee automatically from his motion data. In our previous paper, we used some characteristic postures extracted from the motion data for assessment. However, this method cannot take the timing of motion or the process between the postures into account. Here, we propose using a recurrent neural network (RNN) to deal with this problem. We applied the quasi-Newton method to accelerate the learning process, and the minimum description length principle to decide the network configuration. We verified the effectiveness of the proposed method by using actual examinees’ motion data and assess their skill with RNN.

Kyosuke Koishih, Shintaro Kinoshita, Daigo Muramatsu, and Takashi Matsumoto: “Online Signature Verification Based on User-Generic Fusion Model with Markov Chain Monte Carlo, Taking into Account User Individuality”, J. Advanced Computational Intelligence and Intelligent Informatics, Vol.13, No.4, pp.447-456, 2009

Online signature verification is a promising biometric person authentication method. However, the verification accuracy of online signature verification is not high enough and still needs to be improved. In this paper, to improve the verification accuracy, we propose to generate several fusion models and combine the models. We divide a dataset for model training into several groups, and generate several fusion models associated with the groups. Then, we combine the fusion models using user-dependent model reliabilities. User-dependent model reliability enables us to take users' individuality into account. To evaluate the performance of the proposed algorithm, we conducted experiments using the SVC2004 database. The verification accuracy was improved over the previous algorithm.


Attacks using hill-climbing methods have been reported as a vulnerability of biometric authentication systems. In this paper, we propose a robust online signature verification algorithm against such attacks. Specifically, the attack considered in this paper is a hill-climbing forged data attack. Artificial forgeries are generated offline by using the hill-climbing method, and the forgeries are input to a target system to be attacked. In this paper, we analyze the menace of hill-climbing forged data attacks using six types of hill-climbing forged data and propose a robust algorithm by incorporating the hill-climbing method into an online signature verification algorithm. Experiments to evaluate the proposed system were performed using a public online signature database. The proposed algorithm showed improved performance against this kind of attack.

茂木修樹・長尾明彦：「ヒルクライミング攻撃とその対策：信頼性の高いサインサチュレーションアルゴリズム」精密工学会誌, Vol.75, No10, pp.1216-1221, 2009.10
In milling with ball end mills of inclined surface, geometric quantities such as contact region between the cutting edge and the workpiece surface, undeformed chip thickness along the cutting edge and area of cutting cross-section vary with feed direction of the tool, so cutting forces and chip formation change with tool path. In the first and second parts of this investigation, to predict cutting forces and chip formation in milling for various tool paths, a cutting model proposed in previous paper was extended to the milling process in which both cutting edges of sphere and cylindrical portions engage with the workpiece. It was shown that the cutting forces and the chip formation in upward or downward milling for inclined surface can be predicted by using the developed cutting model and energy method. In this paper, the cutting model is applied to the milling process with pick-feed, and three components of the cutting force and the chip formation under various pick-feeds are predicted. It is shown that the tendency of variation of the cutting forces and the chip formation with tool rotational angle considerably changes by given direction of pick-feed, furthermore in the milling process for the tool moving downward on the inclined surface, interrupted cutting or continuous cutting takes place with magnitudes of pick-feed. Predicted results of the cutting forces are good agreement with experimental results.


In milling with ball end mills of die and mold having various inclined or curved surfaces, tool paths are adopted along an axis of workpiece coordinate system or contour line on workpiece surface. In this paper, a cutting model proposed in previous paper is applied to the milling along the contour line of inclined surface, and cutting forces and chip formation under various inclined angles of the surface are predicted. In the milling of inclined surface in which the left side surface of feed direction of the tool rises, it is obtained analytically that the variation of cutting forces with rotational angle becomes large and rapidly changes. This phenomenon is caused by difference of geometric quantities such as tool-workpiece contact region and undeformed chip thickness along the cutting edge with feed direction of the tool on inclined surface. Predicted results are good agreement with experimental results. From 1st to 4th reports of this investigation, it is confirmed that the cutting forces in various milling process in which both cutting edges of sphere and cylindrical portions engage with the workpiece can be predicted well by using the cutting model proposed and energy method.

The short circuit current and conversion efficiency of the poly(multi)-crystalline solar cells are increased by the passivation process using hydrogen plasma. The passivation rate apparently increases at a reverse bias voltage near 0.6V during the hydrogenation process. The effects of the bias voltage on the passivation are large at the substrate temperatures between 200°C and 250°C. The phenomena are likely due to the existence of positively-ionized hydrogen, H⁺. The H⁺ ions can be accelerated from the surface into the bulk by the electric field with the negative bias. The possibility of the H⁺ ions in the bulk silicon has been predicted in the previous reports. The increase of the incorporated hydrogen is confirmed by IR absorption measurements. The enhanced diffusion of hydrogen induced by the reverse bias is supported by the results of spectral response characteristics of the hydrogenated so-

込み原和夫・広田明彦:「斜面のボールエンドミル加工の切削抵抗と切削機構の解析（第4報）ー等高線加工の場合ー」 精密工学会誌, Vol.75, No.11, pp.1345-1349, 2009.11

This study investigates the quantity of spring back using bending tests for various aluminum alloys with different processes and heat treatments. We accumulate those results in a database and analyse them statistically. For this study, we collect basic experimental data related to correlation with the crystal grain characteristics such as the crystal particle size and the crystal grain shape and the quantity of spring background in the bending test. This study is designed to elucidate the plastic deformation behavior of fine crystal grains.


Materials cut from bulk using a laser apparatus show differences of material organization and material properties because irradiation sites are affected by considerable heat. Consequently, the distortion distribution and crystal orientation distribution show different crystal orientation and distribution: the Young’s modulus and macroscopic mechanical properties differ too. For bending work of the excised material, high-precision bending work is dependent upon accurate prediction of springback, requiring consideration of microscopic properties. In light of that background, we selected various steel materials (SPCC, SUS, etc.) and aluminum alloy to perform this study of observation of heat differences of laser-processed materials. The micro-Vickers hardness at various sites was investigated to determine the micro-Vickers hardness distribution. Results of these experiments were combined for consideration of the relation between changes in the materials and their mi-


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Metallic materials for bending plastic forming are processed using hot or cold rolling. When bending the as-received material, it is expected that material characteristics will differ if differences exist in the rolling directions. In practice, if one arranges the rolling direction with one board, many different material characteristics are obtained. For that reason, if one wants to bend with high accuracy, then it is necessary to consider those small differentials. This study clarifies texture, residual stress, and material characteristic distributions in each rolling direction. A system will eventually be obtained which measures these material characteristics at the processing site, then feeds back data to the production process, thereby achieving highly accurate bending processing.


In this paper, we propose an image-based visual tracking control method of a hand-eye robot for a moving target object. The hand-eye robot is constructed from a three-DoF planar manipulator and a single CCD camera that is mounted on the end-effector. This robot is a typical example of an eye-in-hand system with a single camera. The control objective is to keep the target object around the center of the image plane. In many conventional visual servo methods, it is assumed that the target object is static. Consequently, the visual tracking delay arises in the case of a moving target object. Although we have already proposed a non-delayed visual tracking control method for a moving target object, this method is developed only for a stereo vision robot with two CCD cameras. Therefore, this paper provides such a visual tracking control method for the hand-eye robot. The validity of our control method is evaluated by an experiment.

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