研 究 論 文 抄 録

物 質 生 命 理 工 学 科

K. Iizuka, T. Kon, K. Kato, T. Ishikawa, Y. Kurihara, M. Jimbo, M. Kuroda：“Systematic study of 1-loop correction on sparticle decay widths using GRACE/SUSY-loop”, PoS RADCOR 2009：068, 2010.2
邦文題目：GRACE/SUSY-loopを用いた超対称性粒子崩壊幅の系統的な1ループ補正解析

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.

Masami Chiba, Yoko Arakawa, Toshio Kamijo, Fumiaki Yabuki, Osamu Yasuda, Yuichi Chikashige, Keisuke Ibe, Tadashi Kon, Yutaka Shimizu, Yasuyuki Taniuchi, Michiaki Utsumi, Masatoshi Fujii：“Radar for salt ultra-high-energy neutrino detector and contribution of W-gluon fusion process to collision of neutrinos against protons”, Nucl. Instrum. Meth. A604：S233-S235, 2009
邦文題目：レーダーを用いた超高エネルギーニュートリノ検出法と陽子との衝突におけるW-グルーオン散乱の影響

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 1x10^-6 was found at the energy deposit of 1x10^19 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.

小柳文子・岩田景新：「領域分けによる武蔵野市補充伝設備の優先順位の決定」成蹊大学理工学研究報告，Vol.46, No.1, pp.35-40, 2009

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.

近　　匡・小柳文子・山内　毅:「ゲーム理論を用いた剣道の試合における戦略の解析」成蹊大学理工学研究報告, Vol.46, No.1, pp.41-45, 2009

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.

小柳文子：「適切な補充電設備配置のための優先順位決定方策」電気学会産業応用部門大会, DR2-4, No.2-31, pp.365-368, 2009. 8. 31

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.

小柳文子:「スマートグリッド技術と動向」, 電気学会自動車研究会研究会資料, VT-10-007, pp.33-38, 2010.2.5

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.

N. Sasaki, H. Okamoto, N. Itamura, and K. Miura："Atomic-Scale Friction of Monolayer Graphenes with Armchair- and Zigzag-Type Edges During Peeling Process", e-J. Surf. Sci. Nanotechnol. 8, (2010), pp.105-111, 2010.3

邦文題目：アームチェア・ジグザグ型エッジを有する単層グラフェンの引き剥がし過程における原子スケール摩擦

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 grapheme 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.

N. Sasaki, S. Kawai, and H. Kawakatsu："Dithering amplitude dependence of STM/DLFM maps on Si(111)-7*7 ", Phys. Rev. B80, 193402, 2009.11

邦文題目：Si(111)-7*7表面のSTM/DFLMマップのディザ振幅依存性

This paper theoretically discusses the nano-scale measurement. Model simulation of dynamic lat-

eral force microscopy (DLFM) regulated by scanning tunneling microscopy (STM) has been performed. The simulated STM/DLFM 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/DLFM maps on Si(111)-7*7 for a small time-averaged tunneling current corresponding to a tip-sample distance larger than 5A, where the atomic relaxation of the tip and the sample is sufficiently small.

M. Ishikawa, R. Harada, N. Sasaki, and K. Miura：“Adhesion and peeling forces of carbon nanotubes on a substrate”, Phys. Rev. B80, 193406, 2009.11
邦文題目：基板上のカーボンナノチューブの凝着力と引き剥がし力

This paper experimentally discusses the nano-scale 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.

N. Sasaki, H. Okamoto, N. Itamura, and K. Miura：“Peeling of Graphene Sheet - Simulation Study”, e-J. Surf. Sci. Nanotechnol. 7, pp.783-786, 2009.7
邦文題目：グラフェンシートの引き剥がし - シミュレーションによる研究

The nanoscale peeling of the graphene sheet is numerically studied by molecular mechanics simulation. In the simulation, a rectangular-shaped monolayer graphene sheet with each side of 38A * 21A, comprised of 310 carbon atoms, is peeled from the rigid graphite surface. The six-membered ring around the center position is lifted. We have first obtained the vertical force-distance curve which reflects the transition of the graphene shape from the surface- to the line-contact during the peeling process. The successive partial peelings of the graphene around the lifting center appear as discrete jumps in the force curve, which induce the arched deformation of the graphene sheet.

S. Kawai, N. Sasaki, and H. Kawakatsu：“Direct mapping of the lateral force gradient on Si(111)-7*7”, Phys. Rev. B79, 195412, 2009.5
邦文題目：Si(111)-7*7表面の水平力勾配の直接マッピング

This paper experimentally discusses the nano-scale 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.

N. Itamura, K. Miura, and N. Sasaki：“Simulation of Scan Directional Dependence of Superlubricity of C60 Molecular Bearings and Graphite”, Jpn. J. of Appl. Phys. 48, 060207, 2009.6
邦文題目：C60分子ベアリングとグラファイトの超潤滑の走査方向依存性のシミュレーション

This paper theoretically discusses the nano-scale 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 $<F_L>$ reaches a maximum within a narrow region approximately in the 〔$10\bar{1}0$〕 direction. For

other regions, $<F_L>$ has a nearly constant value of less than 1 pN. In particular, in the $[12\bar{3}0]$ 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.

S. Satokawa, T. Ohnuki, T. Takahiro, K. Urasaki, T. Kojima：“Adsorptive Removal of tert-Butanethiol on Metal Ion Exchange Y type Zeolite under Ambient Condition”, J. Jpn. Petrol. Inst., Vol. 53, No. 2, pp. 83-88, 2010.3

邦文題目:金属イオン交換Y型ゼオライトを用いたターシャリーブタンチオールの常温吸着除去

Adsorptive removal of *tert*-butanethiol (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 the 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.

K. Urasaki, K. Endo, T. Takahiro, R. Kikuchi, T. Kojima, S. Satokawa：“Effect of Support Materials o the Selective Methanation of CO over Ru Catalyst, Chem. Top. Catal. 53, pp.707-711. 2009

邦文題目:Ru触媒を用いた一酸化炭素の選択メタン化反応における担体材料の効果

Selective methanation 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 (0.175%CO, 17.9%CO_2, 70.9%H_2 and 11.1%H_2O) was selectively converted to CH_4 at wide temperature ranges (200-275°C) over Ru/γ-Al_2O_3, Ru/TiO_2, Ru/H-Y zeolite and Ru/H-beta zeolite catalysts. An increase in Ru amount in Ru/TiO_2 catalyst increased both CO and CO_2 methanation rate and CO/CO_2 selectivity decreased considerably. On the other hand, the increase in Ru content in Ru/γ-Al_2O_3 enhanced the CO methanation activity and that hardly affected to the CO_2 methanation activity.

Toshiaki Tsukuda, Marina Kawase, Ayumi Dairiki, Kenji Matsumoto and Taro Tsubomura：“Brilliant reversible luminescent mechanochromism of silver(I) complexes containing o-bis (diphenylphosphino) benzene and phosphinesulfide”, Chem. Commun,vol.46, No.11, pp.1905-1907,2010.3

邦文題目：o-ビス(ジフェニルホスフィノ）ベンゼンとホスフィンスルフィドを含む銀(I)錯体の明るいルミネッセンスメカノクロミズム

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-emitting 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,

2010.1

邦文題目：銀(I)ビス（ジホスフィン）錯体：光物理と単核錯体の構造の相関

Correlation between the photophysics and the structures of three Ag(I)−bis(diphosphine) complexes ($[Ag(dppbz)_2]NO_3$ ($1\cdot NO_3$), $[Ag(dppe)_2]NO_3$ ($2\cdot NO_3$), and $[Ag(dppp)_2]NO_3$ ($3\cdot NO_3$) (dppbz = 1, 2-bis (diphenylphosphino)benzene, dppe = 1, 2-bis (diphenylphosphino)ethane, dppp = 1, 3-bis (diphenylphosphino)propane) has been investigated using temperature-dependent emission measurements and electrochemical and theoretical methods. All three Ag(I)−bis(diphosphine) complexes have relatively low oxidation potential, which allows metal-to-ligand charge transfer (MLCT) contribution in the lowest excited state of the tetrahedral geometry, which is difficult in other Ag(I) complexes. Both $1\cdot NO_3$ and $2\cdot NO_3$ show orange phosphorescence with moderate quantum yield in air-free methanol at room temperature, while $3\cdot NO_3$ is less emissive in solution at room temperature. In all three complexes the temperature-dependent luminescence measurements in EtOH/MeOH 4:1 (v/v) solution indicate the blue-shift of the emission maximum and the increase of the emission intensity on lowering the temperature. In particular, the sequential emission spectral change with decreasing temperature is observed in $1\cdot NO_3$ and $2\cdot NO_3$. In the glass state at 90 K, all three complexes show intense blue phosphorescence. The theoretical calculation using density functional theory (DFT) suggests that the orange and blue emissions mainly originate from the ^{3}MC excited state based on a square-planar geometry and the ^{3}IL+^{3}MLCT excited state based on a tetrahedral geometry, respectively.

Kenji Matsumoto, Norimasa Matsumoto, Ayumi Ishii, Toshiaki Tsukuda, Miki Hasegawa and Taro Tsubomura：“Structural and spectroscopic properties of a copper(I)–bis(N-heterocyclic)carbene complex”, *Dalton Trans.,* vol.2009, No.34, pp. 6795-6801,2009.9

邦文題目：銅(I)ビス（N-複素環）カルベン錯体の構造と分光学的な性質

The structural and spectroscopic properties of a Cu(I) complex bearing a methylene-linked bis(N-heterocyclic carbene) ligand, $[Cu_2(\mu\text{-Me-mbim})_2](PF_6)_2$ were investigated. X-ray single crystal structure analysis revealed that the complex is binuclear similar to the corresponding silver(I) complex. In $[Cu_2(\mu\text{-Me-mbim})_2](PF_6)_2$, 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 $[Cu_2(\mu\text{-Me-mbim})_2](PF_6)_2$ in methanol shows a strong absorption band (ε = 23 000 dm^3 mol^{-1} cm^{-1}) and a weaker shoulder (ε = 6200 dm^3 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 $[Cu_2(\mu\text{-Me-mbim})_2](PF_6)_2$ 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 $[Cu_2(\mu\text{-Me-mbim})_2](PF_6)_2$ 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 $[Cu_2(\mu\text{-Me-mbim})_2](PF_6)_2$ and the related Cu(I)–diphosphine complex, $[Cu_2(\mu\text{-dcpm})_2](BF_4)_2$ 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,

pp. 2730-2734,2009.9
邦文題目：ホスフィンスルフィドを含む混合配位銅(I)錯体の構造と発光特性

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.

K. Totani, Y. Ihara, T. Tsujimoto, I. Matsuo, Y. Ito：“The Recognition motif of the glycoprotein-folding sensor enzyme, UDP-Glc: glycoprotein glucosyltransferase”, Biochemistry Vol.48, No.13, pp.2933-2940, 2009. 4
邦文題目：糖タンパク質フォールディングセンサー酵素, UDP-Glc:糖タンパク質グルコース転移酵素の認識モチーフ

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.

T. Watanabe, K. Totani, I. Matsuo, J. Maruyama, K. Kitamoto, Y. Ito：“Genetic analysis of glucosidase II β-Subunit in trimming of high-mannose-type glycans”, Glycobiology Vol.19, No.8, pp.834-840, 2009. 8
邦文題目：高マンノース糖鎖の切断におけるグルコシダーゼII β-サブユニットの遺伝的解析

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 glycosidase 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 faction 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.

Y. Haga, K. Totani, Y. Ito, T. Suzuki：“Establishment of a real-time analytical method for free oligosaccharide transport from the ER to the cytosol”, Glycobiology, Vol.19, No.9, pp.987-994, 2009. 9
邦文題目：小胞体から細胞質への遊離オリゴ糖輸送に関するリアルタイム分析法の確立

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.

H. Dan, Y. Kamiya, K. Totani, D. Kamiya, N. Kawasaki, D. Yamaguchi, I. Matsuo, N. Matsumoto, Y. Ito, K. Kato, K. Yamamoto：“Sugar-binding activity of the MRH domain in the ER α-glucosidase II β subunit is important for efficient glucose trimming”, Glycobiology, Vol.19, No.10, pp.1127-1135, 2009. 10

邦文題目：小胞体α-グルコシダーゼII βサブユニットにおけるMRHドメインの糖結合活性は効果的なグルコース切断に重要である

Glucosidase II (GII) is a glycan-processing enzyme that trims two alpha1,3-linked glucose residues from N-glycan on newly synthesized glycoproteins. Trimming of the first alpha1,3-linked glucose from Glc(2)Man(9)GlcNAc(2) (G2M9) is important for a glycoprotein to interact with calnexin/calreticulin (CNX/CRT), and cleavage of the innermost glucose from Glc(1)Man(9)GlcNAc(2) (G1M9) sets glycoproteins free from the CNX/CRT cycle and allows them to proceed to the Golgi apparatus. GII is a heterodimeric complex consisting of a catalytic alpha subunit (GIIalpha) and a tightly associated beta subunit (GIIbeta) that contains a mannose 6-phosphate receptor homology (MRH) domain. A recent study has suggested a possible involvement of the MRH domain of GIIbeta (GIIbeta-MRH) in the glucose trimming process via its putative sugar-binding activity. However, it remains unknown whether GIIbeta-MRH possesses sugar-binding activity and, if so, what role this activity plays in the function of GII. Here, we demonstrate that human GIIbeta-MRH binds to high-mannose-type glycans. Frontal affinity chromatography revealed that GIIbeta-MRH binds most strongly to the glycans with the alpha1,2-linked mannobiose structure. GII with the mutant GIIbeta that lost the sugar-binding activity of GIIbeta-MRH hydrolyzes p-nitrophenyl-alpha-glucopyranoside, but the capacity to remove glucose residues from G1M9 and G2M9 is significantly decreased. Our results clearly demonstrate the capacity of the GIIbeta-MRH to bind high-mannose-type glycans and its importance in efficient glucose trimming of N-glycans.

Y. Takeda, K. Totani, I. Matsuo, Y. Ito：“Chemical approaches toward understanding glycan-mediated protein quality control”, Current Opinion in Chemical Biology, Vol.13, No.5-6, pp.582-591, 2009. 12

邦文題目：糖タンパク質品質管理の理解に向けた化学的アプローチ

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.

Hiroyoshi Tsuyuki, Mitsuyoshi Tomiya, Shoichi Sakamoto, and Masaki Nishikawa, "Scar-Like States in Dynamical Electron-Wavepackets in Chaotic Billiard", e-J. Surf. Sci. Nanotech. Vol. 7　721-727, 2009.6
邦文題目 ： カオスビリヤード内における動的電子波束におけるスカー的状態

The time-evolution of the wavepacket inside chaotic and integrable two-dimensional (2D) nanostructures isnumerically studied. We have found the enhancement around the classical periodic orbits during the time-evolutionin the stadium billiard. It is similar to the scars in the standing wave of the chaotic billiards. The initial positionand velocity, and the shape of the wavepacket are crucial for the enhancement, but we can observe that the remnantof the initial wavepacket travels along the unstable periodic orbit. Then the wavepacket gradually diffuses aroundthe structure. This behavior has close relation to the dynamical properties of electrons in the structure, e.g., theconductivity, the magneto-resistance etc. The quantum fidelity, which can measure the robustness of dynamicalstates inside the nanostructures, is also discussed.

情　報　科　学　科

岩崎　学・大道寺香澄 :「ゼロ過剰な確率モデルとそのテスト得点の解析への応用」行動計量学, Vol. 36, No. 1, pp. 25-34, 2009. 5

全部で n 題の問題からなるテストの正答数の分布を考察する。本論では正答数の分布のモデルとしてベータ二項分布を想定する. WEBを用いた試験などでは，機器の操作ミスなどで得点が 0 点となることが少なからずある。その種の得点分布としてゼロ過剰なベータ二項分布を仮定し，モーメント法によるパラメータの推定法を提案する。ゼロ過剰な分布は主要部分の分布と 0 にマスを持つ1点分布の混合であるが，その拡張として確率の小さな二項分布との混合モデルも提案し，パラメータの推定法を与える。実際のテスト得点のデータにそれらの分布を当てはめた結果，良好な当てはまりが得られたことを報告する。

河田裕一・岩崎　学 :「不完全データに基づく平均への回帰を考慮したテストデータの解析」日本テスト学会誌, Vol. 5, No. 1, pp. 41-51, 2009. 6

ある正答数以下の学生に対して補習を行い，その学習効果を補習後のテストで確認するような状況を考える。本論文では，テストの正答数の分布にベータ二項モデルを当てはめる。ある正答数以下の学生のデータが得られている場合の補習後のテストの正答数の分布を，補習前後で問題数が必ずしも同じでなくても良いモデルを考え，補習後ならびに補習前後の変化量の期待値と分散を提示する。この期待値と分散を用い，また，データの不完全性の程度を3種類（選択・打ち切り・トランケーション）に分類し，それぞれの状況ごとにモーメント法によるパラメータ推定方法を提案する。特に選択と打ち切りの間では，パラメータ推定精度に違いが少なく，実用的であることがわかった。また，いずれのパラメータ推定方法においても，平均への回帰を考慮した検定を適応した結果，良好な結果が得られ，妥当な検定の適用が学習効果を正確に把握するために重要であることが示唆された。

Y. Furukawa, M. Iwasaki and A. Tanaka : "A practical method for determining minimum detectable values in pulse-counting measurements", *Analytical Sciences*, Vol. 26, 259-265, 2010. 2.
邦文題目 : パルス計数データにおける最小検出限界値決定のための実用的手法

The purpose of this paper is to propose a statistical method for determining minimum detectable values in the pulse counting measure-

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.

天達洋文・上田　徹：「ARモデルとフラクタル分析による株価予測の検証」オペレーションズ・リサーチ, vol.54, No.9, pp.576-582, 2009.9

株価は企業業績または効率の総合評価指数と言われることがある。DEAと異なり，株価では，DMUの経営的分析や効率の改善計画の策定はできないが，株価の予想を通じて将来の効率を予測できる可能性がある。本論文では，ARモデルとフラクタル分析を組み合わせることにより，株価を長期間にわたって予測できるアルゴリズムを提案した。

T. Ueda and H. Amatatsu：“Determination of Bounds in DEA Assurance Region Method- Its Application to Evaluation of Baseball Players and chemical companies”, The journal of operations research of Japan 2009, vol.52, No.3, pp.453-467, 2009.9

邦文題目：DEA領域限定法における境界値の決定—野球選手と化学会社評価への適用

In Data Envelopment Analysis (DEA) many optimal weights (multipliers) for inputs and outputs may become zeros. This means that corresponding inputs or outputs are neglected. To improve this shortcoming the assurance region methods which have bounds on the ratios of weights have been proposed. Deciding bounds depends on the data, and in some cases it requires judgments from experts. However, it is generally a difficult task to put their judgments into the quantitative bounds. We propose new methods by which the bounds are derived easily from limited information, i.e., partial ranking data. The methods are applied to the evaluation of baseball players and chemical companies

天達洋文・上田　徹：「産業連関表とネットワークDEAによる都道府県の効率分析」オペレーションズ・リサーチ，vol.55, No.1, pp.48-55, 2010.1

産業連関表は，ノーベル経済学賞のワシーリ・レオンチェフやリチャード・ストーンらの先駆的研究に始まり，産業連関分析や国民経済計算などに広く使われている。日本国内はもとより，UNIDO（国連工業開発機構）東京事務所によると世界のGDPの98%を占める国家や地域で産業連関表は作られている。マトリックス形式なので，コンピュータ処理しやすく，数理計画法でも容易に扱える。ネットワークDEAは外部との入出力と内部組織間の入出力とを用いて，組織全体の効率と各部門の効率を測定する手法であるが，従来のネットワークDEAは始点と終点を持つ組織を対象としていた。これに対し，産業連関表は生産と消費の関係をマトリックス形式で記述しているため，始点と終点のないマトリックス型組織を想定したネットワークDEAのアルゴリズムを提案した。また，マトリックス型組織は入出力の数が多いために，大部分のDMUの効率値は1になることが多く，1よりも大きな効率値を求めることができる超効率値モデルも提案した。これらの方法を都道府県の効率分析に適用し，各都道府県の効率性を改善する方策について考察した。

Y. Obu, K. Maruo, T. Yonekura, M. Kamada, and S. Okamoto：“State-Transition Diagram for Visual Programming Tool GUEST,” Lecture Notes in Business Information Processing,Volume 18, pp.214-227,2009.4

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.t

M. Kohana, S. Okamoto, M. Kamada, and T. Yonekura：“Improving bottleneck in Web-based MORPG,” Proceedings of 2009 IEEE Pacific Rim Conference on Communications,Computers and Signal Processing (PACRIM'09), pp.419-424, 2009.8

The recent spread of broadband Internet access,speeding up of JavaScript in Web browsers, and development of communications technology such as Ajax has 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 singleserver system and propose a technique to improve the usability of Web-based MORPG servers.

Kimio Oguchi ： “Content Transfer and Supporting Technologies in a Home Environment over Next Generation Convergence Home Network - From Vital Information Transfer to Broadband Content Transfer”, International Journal of Digital Content Technology and its Application, Vol.3, No.3, pp.124-135, 2009.9
邦文題目：次世代ホームネットワークを利用したホーム環境におけるコンテンツ転送と関連技術

Content transfer and its relevant technologies in a home environment are overviewed from several view points of lower layer functions. After viewing the next generation home network application image that the author has been proposed, its technical study items are dealt with. They are clarified from the technical perspective and the author’s viewpoint.

Kimio Oguchi and Dai Hanawa：“Wavelength Routing Network Test-bed for Large Contents Distribution Applications in a Campus”, J. Fac. Sci. Tech., Seikei Univ. Vol.46, No.2, pp.87-90, 2009.12.
邦文題目：キャンパス内における大容量コンテンツ転送用波長ルーチングネットワークテストベッド

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 verily the feasibility of the network.

Takahiro Kondoh, Fumiaki Kato, Munenori Kai ： “Implementation of self-backup mechanism and inter-agent communication for strong migration mobile agent system”, Proc. of IEEE Pacific Rim Conference on Communications, Computers and Signal Processing（PACRIM’09）, pp.576-581, 2009.8
邦文題目：強マイグレーションモバイルエージェントシステムにおけるエージェントの自己バックアップ機能の実現とエージェント間通信機構の実装

The authors have been developing a strong migration mobile agent system in Java. Using the system, we are developing the platform of an autonomic 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.

Yuki Akai, Kazuaki Wakao, Takashi Yokouchi, Munenori Kai：“Development of the Strong Migration Mobile Agent System AgentSphere for Autonomic Distributed Processing”, Proc. of IEEE Pacific Rim Conference on Communications, Computers and Signal Processing（PACRIM'09）, pp.582-587, 2009.8
邦文題目：自律型分散処理のための強マイグレーションモバイルエージェントシステム AgentSphere の開発

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.

Kazuhiro Saito, Hiroko Midorikawa, Munenori Kai：“Page Replacement Algorithm using Swap-in History for Remote Memory Paging”, Proc. of IEEE Pacific Rim Conference on Communications, Computers and Signal Processing (PACRIM'09), pp.533-538, 2009.8
邦文題目：遠隔メモリページングのための Swap-in 履歴を用いたページ置換アルゴリズムの開発

The Distributed Large Memory system, DLM, was designed to provide a larger size of memory beyond that of local physical memory by using remote memory distributed over cluster nodes. The original DLM adopted a low cost page replacement algorithm which selects an evicted page in address order. In the DLM, the remote page swapping is the most critical in performance. For more efficient swap-out page selection, we propose a new page replacement algorithm which pays attention to swap-in history. The LRU and other algorithms which use the memory access history generate more overhead for user-level software to record memory accesses. On the other hand, using swap-in history generates little costs. According to our performance evaluation, the new algorithm reduces the number of the remote swapping in the maximum by 32% and gains 2.7 times higher performance in real application, Cluster3.0. In this paper, we describe the design of the new page replacement algorithm and evaluate performances in several applications, including NPB and HimenoBMK.

加藤史彬・甲斐宗徳：「強マイグレーション化モバイルエージェントの自己バックアップ機構の実装」，成蹊大学理工学研究報告, Vol.46, No.1, pp.25-34, 2009.6

筆者らは強マイグレーションモバイルエージェント利用した自律分散処理システムのプラットフォーム，AgentSphere を開発してきた。本研究では従来の AgentSphere に，エージェントが実行途中データを含めた自分自身のバックアップを作成できる機能を新たに実装した。ユーザは，backup 命令をエージェントのコード中に記述することにより，このエージェントの自己バックアップ機能を利用することができる。バックアップされたエージェントはネットワーク上の AgentSphere が動作している他のマシンに送り込まれることが出来，もしオリジナルのエージェントが不測の事態により停止したときには，オリジナルのエージェントの代わりに処理を継続するために活動を開始することが出来る。これによりシステムの耐障害性を向上させることが出来る。また backup 命令をエージェントのコードの適切な位置に自動挿入する機能も合わせて提案し，実装した。これによりユーザは，アプリケーション用のエージェントを，簡単に自己バックアップ機能を持つエージェントに変換することができる。

H. Midorikawa, K.Saito, M.Sato, T.Boku：“Using a Cluster as a Memory Resource：A Fast and Large Virtual Memory on MPI”, Proc. of IEEE Cluster Computing (cluster2009), (Digital Object Identifier 10.1109/CLUSTR.2009.5289180), pp.1-10, 2009.9
邦文題目：クラスタをメモリ資源として使う：MPIを利

用した高速大容量メモリ

The 64-bit OS provides ample memory address space that is beneficial for applications using a large amount of data. This paper proposes using a cluster as a memory resource for sequential applications requiring a large amount of memory. This system is an extension of our previously proposed socket-based Distributed Large Memory System (DLM), which offers large virtual memory by using remote memory distributed over nodes in a cluster. The newly designed DLM is based on MPI (Message Passing Interface) to exploit higher portability. MPI-based DLM provides fast and large virtual memory on widely available open clusters managed with an MPI batch queuing system. To access this remote memory, we rely on swap protocols adequate for MPI thread support levels. In experiments, we confirmed that it achieves 493 MB/s and 613 MB/s of remote memory bandwidth with the STREAM benchmark on 2.5 GB/s and 5 GB/s links (Myri-10G x2, x4) and high performance of applications with NPB and Himeno benchmarks. Additionally, this system enables users unfamiliar with parallel programming to use a cluster.

緑川博子・齋藤和広・佐藤三久・朴　泰祐：「クラスタをメモリ資源として利用するためのMPIによる高速大容量メモリ」, 情報処理学会論文誌, コンピューティングシステム, Vol.2, No.4, pp.15-36, 2009.12

64bitOS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，クラスタの各ノードの遠隔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スワ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 のスワップシステムとは独立にユーザレベルソフトウエ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他手法に比べ，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，従来はクラスタに縁のなかった，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バッチ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。

Myri-10G/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，稼動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。

Taku Itoh：“A Method of Normal Estimation from Node Coordinates by an Implicit Function with Appropriate Constraints”, In AIP Conference Proceedings 1168 (ICNAAM 2009), Vol. 1, pp. 482-485, Crete, 2009.9.

邦文題目：適切な制約と共に生成された陰関数による節点座標からの法線推定法

座標情報以外は一切の情報を含まない節点群が与えられたとき，各節点における法線を推定する方法を提案する。同法では，与えられた節点から陰関数を生成することで法線を推定している。従来の方法によって生成された陰関数から推定される法線は，微分不可能点近傍で精度が落ちる。一方，提案法では，陰関数生成時に微分不可能点近傍に適切な制約を与えることで，高精度な推定を可能としている。提案法の有効性は，数値実験において例証した。

Ayumu Saitoh, Taku Itoh, and Atsushi Kamitani: “Development of Dual-Reciprocal Extended Boundary-Node Method”, In AIP Conference Proceedings 1168 (ICNAAM 2009), Vol. 1, pp.350-353, Crete, 2009.9

邦文題目：二重相反拡張境界節点法の開発

従来の境界節点法では，境界積分を評価する際に積分セルと呼ばれる仮想的な境界要素を生成する必要がある。一方, 本論文では，２次元問題において，積分セルを用いずに境界節点法を再定式化することで，要素の概念を完全に取り払った拡張境界節点法を提案している。数値実験では，従来法と比較して提案法から得られる解の精度が高いことを示した。

また，節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。

Taku Itoh：“A Method of Boundary Estimation from 3D Scattered Point Data without Normals by Implicit Function and Delaunay Tetrahedralization”, In Asia Simulation Conference 2009 proceedings (CD-ROM), Paper ID：064, Kusatsu, 2009.10
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, S.Tsumura and S.Kuribayashi：“Fair joint multiple resource allocation K.Hatakeyama, Y.Osana, M.Tanabe and S.Kuribayashi, “Proposed congestion control method reducing the size of required resource for all-IP”, Pacrim2009, 2009.8
邦文題目：オールIPネットワークにおける要求資源量削減を許容するふくそう規制方式

In all-IP networks, where all types of services are integrated using IP technology, it is highly likely that traffic congestion in one service causes congestion in other services, or that abnormal traffic in one service degrades the quality of other services. Assuming that multiple types of resources are simultaneously allocated to each service in all-IP networks, this paper proposes a smart congestion control method which reduces the size of required resource for congested resource type, instead of restricting all service requests. Then, this paper proposes the user service specifications for the proposed congestion control, and clarifies the algorithm to decide the optimal size of required resource to be reduced, based on the load offered to the system. It is demonstrated by simulation evaluations that the proposed congestion control method can handle more requests compared with the conventional methods and relieve the congestion.

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.

K.Suzuki, Y.Osana and S.Kuribayashi：“Proposed TV advertising model allowing users to select their favorite commercial”, ICOIN2010, Session 6B, 2010.1
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-

gram, is proposed. This paper also provides solutions to critical issues for implementing the proposed model. Especially, the advertising fee would be decided by 'auction', in addition to the audience rating of each program. It is clarified in this paper that the proposed model could be beneficial to all parties concerned, such as users, sponsors, broad-casting companies, commercial contents productions and broadcast program productions. Moreover, the proposed commercial delivery mechanism can promote the on-demand viewing and should contribute to energy saving greatly, compared with broadcasting viewing of TV program over broadband networks.

茂木美智子・栗林伸一 :「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電製品はエアコン，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放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式を提案している。具体的には，レッドタクトン技術を利用して利用者がテレビの設置してあ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・栗林伸一 :「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ることが多かった。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。

K. Sugiyama, N. Sagara, Y. Kashimura：“Estimation of Mosquito Noise Level from Decoded Picture” The Institute of Electrics, Information and Communication Engineers, Transactions on Fundamentals, Vol. E92-A, No.12, pp.3291-3296, 2009.12

邦文題目：復号画像からのモスキートノイズ量推定

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.

杉山賢二・相良直哉・有住正央 :「画像間処理でＩピクチャ効率を改善した動画像符号化」電子情報通信学会論文誌, Vol.J92-D, No.10, pp.1702-1704, 2009.10

MPEGなどの動画像符号化で必要なＩピ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Iピ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

Networks", Journal of Mobile Multimedia (JMM), Vol. 5, No.1, pp.45-63, 2009.

邦文題目：Ｐ２Ｐオーバレイネットワークでの多ソース・ストリーミング・モデルでのデータ転送手続き

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.

Mimoza Durresi, Vamsi Paruchuri, Arjan Durresi, Leonard Barolli, and Makoto Takizawa："A Scalable Anonymous Protocol for Heterogeneous Wireless Ad Hoc Networks", Journal of Embedded Computing, Vol.3, No.1, pp.77-85, 2009

邦文題目：異種無線アドホック・ネットワークの大規模アノニマス・プロトコル

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.

Takuya Tojo and Makoto Takizawa："Synchronous Transmission Protocol for Exchanging Real-Time and Non-Real-Time Multimedia Data in Group Communication", International Journal of High Performance Computing and Networking (IJHPCN), Vol.5, Nos.5/6, pp.364-373, 2009

邦文題目：グループ通信での実時間および非実時間データ通信のための同期型プロトコル

In group communications, multiple processes send packets to multiple processes while receiving packets from multiple processes in a group. Even if each sender process sends packets to a receiver process at a rate that the receiver process can receive, packets from multiple sender processes may come to the process at a so high rate that the receiver process cannot receive, i.e., multi-source buffer overrun. In this paper, we propose a novel Synchronous Transmission Procedure (STP) where multiple processes do not arbitrarily send, i.e., synchronously send packets to a common destination process to resolve the multi-source buffer overrun.

Naohiro Hayashibara and Makoto Takizawa："Design of the Notification System for Failure Detectors", International Journal of High Performance Computing and Networking (IJHPCN), Vol.6, No.1, pp.25-34, 2009

邦文題目：障害検出のための通知システムの設計

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.

Tomoya Enokido and Makoto Takizawa：“A Purpose-based Synchronization Protocol of Multiple Transactions in Multi-Agent Systems”, International Journal of Business Intelligence and Data Mining (IJBIDM), Vol.4, No.1, pp.99-117, 2009

邦文題目：多エージェント・システムでのトランザクションを同期するための目的志向同期プロトコル

Multiple agents cooperate with each other through manipulating objects. A transaction is a unit of work issued by an agent. A transaction is assigned with a purpose which is a subfamily of roles granted to the agent. Even if transactions issue methods according to the purposes, illegal information flow might occur. We define legal, independent, illegal, and possibly illegal information flow relations among purposes. We discussed the purpose-based marking protocol to prevent illegal information flow. Then, we discussed the releasing mechanism of purpose marks to improve the throughput. Finally, we evaluated the Purpose-based Marking and Releasing (PMR) protocol.

Tomoya Enokido and Makoto Takizawa：“A Legal Information Flow (LIF) Scheduler Based on Role-based Access Control Model”, International Journal of Computer Standard and Interfaces (CSI), Vol.31, No.5, pp.906-912, 2009.9

邦文題目：ロール・ベースのアクセス制御モデルに基づいた正しい情報流(LIF)をもたらすスケジューラ

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 ⊴I R_2) among a pair of role families R_1 and R_2 to prevent illegal information flow. Here, an LIF relation R_1 ⊴I R_2 shows that noillegal 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 ⊴S 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 op_1 and op_2, respectively, to an object *o*. If R_1 ⊴S R_2, op_2 is performed on the object *o* prior to op_1. 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 significancy and information flow rela-

tion of roles families. We evaluate the LIF scheduler in terms of how much illegal information flow can be prevented compared with the other scheduler.

Youhei Tanaka, Tomoya Enokido, and Makoto Takizawa：“Transactional Agents on Distributed Object Systems”, International Journal of High Performance Computing and Networking (IJHPCN), Vol.6, No.2, pp.148-159, 2009

邦文題目：分散オブジェクト・システムのトランザクション型エージェント・モデル

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.

Kenichi Watanabe, Tomoya Enokido, and Makoto Takizawa ： “Trustworthiness of Acquaintances in Peer-to-Peer Overlay Networks”, International Journal of High Performance Computing and Networking (IJHPCN), Vol.6, No.2, pp.160-171, 2009

邦文題目：P2Pオーバーレイ・ネットワークでの知人ピアの信用可能性

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 a target object. We newly take an acquaintance approach.Anacquaintance 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.

Satoshi Kawanami, Tomoya Enokido, and Makoto Takizawa：“Heterogeneous Clock Group Protocol for Causally Ordered Delivery of Messages”, International Journal of Wireless and Mobile Computing (IJWMC), Vol.3, No.4, pp.247-254, 2009

邦文題目：メッセージの因果順序配送するための異種時間グループ・プロトコル

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.

Ailixier Aikebaier and Makoto Takizawa：“A Protocol for Reliably, Flexibly, and Efficiently Making Agreement among Peers”, International Journal of Web and Grid Services (IJWGS), Vol.5, No.4, pp.356-371, 2009

邦文題目：ピア間の信頼性があり柔軟な効率的な合意プロトコル

In Peer-to-Peer (P2P) applications, peers exchange their opinions with each other and make an agreement on one opinion. Agreement proce-

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.

Tomoya Enokido and Makoto Takizawa：“A Purpose-based Synchronization Protocol for Secure Information Flow Control”, International Journal of Computer Systems Science and Engineering (CSSE), Vol.25, No.2, pp.25-32, 2010.3

邦文題目：安全な情報流制御のための目的志向同期プロトコル

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.

Alireza GoudarziNemati, Tomoya Enokido, and Makoto Takizawa：“Scheduling Algorithms for Concurrently Streaming Multimedia Objects in P2P Overlay Networks”, International Journal of Computer Systems Science and Engineering (CSSE), Vol.25, No.2, pp.47-61, 2010.3

邦文題目：P2Pオーバーレイ・ネットワークでのマルチメディア・オブジェクトの並列ストリーミングのためのスケジューリング・アルゴリズム

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.

Jianhua Ma, Leonard Barolli, Makoto Takizawa, and Runhe Hua：“A Pure P2P Synchronous Collaborative System”, International Journal of Applied Systemic Studies (IJASS), Vol.3, No.1, pp.44-58, 2010

邦文題目：P2P同期型共同作業システム

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).

Kojiro Taguchi, Tomoya Enokido, and Makoto Takizawa：“A Broadcast Type Hierarchical Group Communication Protocol”, International Journal of Applied Systemic Studies (IJASS), Vol.3, No.1, pp.102-114, 2010

邦文題目：放送型階層グループ通信プロトコル

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.

K. Watanabe, Y. Kurihara and H. Tanaka：“Ubiquitous Health Monitoring at Home –Sensing of Human Biosignals on Flooring, on Tatami Mat, in the Bathtub, and in the Lavatory”, IEEE Sensors Journal, Vol.9, No.12, pp.1847-1855, 2009.9

邦文題目：ユビキタス在宅健康モニタリング―フローリング，畳，風呂，トイレでの生体情報計測―

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.

栗原陽介・渡辺嘉二郎・米山　満：「加速度センサを用いた歩行・ランニング時におけるMET s 値推定」電気学会論文誌C，Vol.129，No.8，pp.1562-1568，2009.8

It is quite important for Japan to maintain or promote the health condition of elderly citizens. 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.

栗原陽介・渡辺嘉二郎・小林一行・田中　博：「光センサを用いた嚥下時における先行時間，頤舌骨筋筋力，甲状舌骨筋筋力の推定による嚥下能力評価法」人間工学，Vol.45，No.2，pp.110-117，2009.4

In the rehabilitation of dysphagia patients,

judging the swallow ability and understanding its process are essential. Appropriate rehabilitation policies and dieraty 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 thyrohyid 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, which stands for the standard swallow ability 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.

Rehm, M. Nakano, Y. André, E. Nishida, T. Bee, N. Endrass, B., Wissner, M. Lip,i A. A., Huang, H.-H.：“From observation to simulation: generating culture-specific behavior for interactive systems”, AI & Society, vol. 24, no. 3, pp. 267-280, Springer Press, 2009.

邦文題目：観察からシミュレーションへ―インタラクティブシステムにおける文化固有の行動の生成―

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.

Huang, H. H., Cerekovic, A., Pandzic, I., Nakano, Y., and Nishida, T.：“Toward a Multi-culture Adaptive Virtual Tour Guide Agent with a Modularized Approach”, AI & Society, Journal of Knowledge, Culture and Communication, Vol. 24, No.3, pp225-235, Springer Press, October 2009

邦文題目：モジュール化によるアプローチを用いた複数文化適応的なヴァーチャル旅行ガイドエージェントに向けて

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.

Shuji Kawasaki, Masakazu Higuchi, Hitomi Murakami：“On Modeling Ubiquitous Cloud：Estimation of Traffic”, WSEAS TRANSACTION on MATHEMATICS, Issue 9, Volume 8, pp. 530-540, 2009.9

邦文題目：ユビキタス網おけるトラフィックのモデル化

これからの通信の基幹となるユビキタス網には，高速なコンテンツを発生させるテレビに代表される大容量実時間システムから，情報は間欠的だが極めて数の多い，たとえばセンサーやタグなどが接続される。さらに，センサー情報は，携帯電話のGPSのように時間的に移動する，とういう特徴をもつ。こ

のような環境での網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。

Shuji Kawasaki, Jonah Gamba, Masakazu Higuchi, Hitomi Murakami：“A design method of FIR low-pass filters with steep cut-off and low taps”,Far East Journal of Electronics and communications, Volume 3, Issue 3, Pages 227-249, 2009.12

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，ハードウエア設計でも問題になる。本論文では，Fourier級数に基本を置いた従来手法に対し，フルエンシー技術を用いたフィルタ設計法を開発, 急峻なCut-Off特性のFIRフィルタを例にとりその具体例を示した。また乗算器も従来法に比べ，大きく減少させうることも示した。

K. Hirano, Y. In, M. Kitazume, M. Higuchi, S. Kawasaki, H. Murakami：“Method of Event Location Identification Using GPS and Camwra 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不可欠な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像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。

Jonah Gamba, Tetsuya Shimamura, Shuji Kawasaki, Masakazu Higuchi, Hitomi Murakami：“A joint iterative estimation of noise variance and AR parameters”, IJISCE (International Journal of Information Sciences and Computer Engineering Volume 2, Number 2, 2010.2

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，低次Yule-Walkerに基ず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。

Munenori Kakehi , Tetsuo Yamada , Ichie Watanabe：“PLM education in production design and engineering by e-Learning”, Int. J. Production Economics, pp.479–484, 122 (2009)

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.

Munenori Kakehi, Ichie Watanabe , Ruijie Yang , Junpei Susuki , Kinya Tamaki , Tetsuo Yamada , Eiichiro Yagi , Yusuke Suzuki “Proposal of WS-BOM Data Base System and Digital Operation Instruction Sheet for Work System Design on the Vending Machine Manufacturing”, The Proceedings of the 10th Asia Pacific Industrial Engineering & Management System Conference and the 11th Asia Pacific Regional Meeting of International Foundation for Production Research, 2009.12

邦文題目：自動販売機製造における作業システム設計のための 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

壹岐浩幸・吉村秀太・瓜生　芳久：「発電機励磁制御のためのパラメータ空間設計法の適用」電気学会電力エネルギー部門誌，Vol.129, No.11，pp.1365-1372，2009.11

発電所における発電機励磁装置のための動特性試験，「発電機インディシャル応答試験」並びに「負荷遮断試験」における制御パラメータ感度調整は，一般的に古典制御理論のボード線図を用いられる場合が多い。近年，制御工学は古典から現代，さらにアナログからディジタルへと時代とともに変貌し，様々な現代制御理論を用いた励磁制御が生まれてきたが，現実にはほとんどの実系統で実用化されていない。また現在でも，励磁制御性能の評価は，ボード線図を用いて現場の電気技術者の経験において行なわれ，非常に手間が掛かっている。本研究では，電気技術者が動特性試験時に励磁制御方式の制御パラメータ調整をスムーズに行えるために，PCの入力画面機能を活用しやすい数式処理的手法を用いて，ロバスト性指標における周波数領域の「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能領域を可視的に表現し，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法に基づく方法を提案している。

Makoto Hamabe, Tomohiro Fujii, Atsushi Sasaki, Yuji Nasu, Satarou Yamaguchi, Akira Ninomiya, Tsutomu Hoshino, Yasuhide Ishiguro, and Kuniaki Kawamura : “Recent Progress of Experiment on DC Superconducting Power Transmission Line in Chubu University”, IEEE Trans. On App. Super. Vol.19, No.3, pp1778-1781，2009.6

邦文題目：中部大学における直流超伝導送電ケーブルの進捗状況

A test stand of a DC superconducting power transmission cable was finished to construct in October 2006 in Chubu University, Japan, and 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 shows the similar temperature dependence; conclusively, the HTS tapes suffered no damage after cooling and heating process between the 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.

Shinichi Nomura, Koji Kasuya, Norihiro Tanaka, Kenji Tsuboi, Hiroaki Tsutsui, Sunnji Tsuji-Iio, Ryouchi Shimada, Kazuaki Arai, Akira Ninomiya, and Takeshi Ishigohka : “Quench Properties of a 7-T Force-Balanced Helical Coil for Large-Scale SMES”, IEEE Trans. On App. Super. Vol.19, No.3, pp2004-2007, 2009.6

邦文題目：超伝導磁気エネルギー貯蔵装置用電磁力平衡コイルの７T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 270kJ 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.

碇　直史・越智崇文・大倉元宏：「視覚情報制限下における超指向性スピーカの進路誘導性の評価」日本交通科学協議会誌，9(1)，pp.19-24，2009.11

Evaluating the directional guidance provided by a parametric loudspeaker to blindfolded pedestrians

This paper deals with the effects of ambient sound on the directional guidance provided by a parametric loudspeaker, which offers much sharper directivity than conventional loudspeakers. In our experiment, twelve blindfolded (sighted) pedestrians were asked to walk toward audible traffic signals emitting from either a parametric or conventional dynamic loudspeaker located 22 meters distant, under two ambient sound conditions. In one portion of the test, a conventional loudspeaker emitting white noise was placed 5 m to the right, and midway down the path the pedestrians were requested to follow. 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害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・山本紗恵子：「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.

小方博之・山本紗恵子：「リカレントニューラルネットワークによるパタースイングスキルの自動評価」精密工学会誌, Vol. 74, No. 11, pp. 1210-1214, 2008.11

The progress of information technology and the popularization of the personal computer brought the growth of computer-based testing (CBT), which utilize computer to hold an exam and rate examinees. Most of the current CBT can be regarded as an extension of the paper-and-pencil exam, and aim to assess the knowledge or the achievement of the examinees. On the other hand, very few CBT systems address assessing examinees' skill in sports or manufacturing.

This paper discusses a method to evaluate examinees' physical skill from their motion data, taking golf putt swing as an example. The motion data is generally represented as a vector time series. The recurrent neural network is introduced to deal with such data. We verified the effectiveness of the proposed method by collecting actual examinees' motion data and assess them using the proposed method.

Daigo Muramatsu：“Hill-Climbing Attacks and Robust Online Signature Verification Algorithm against Hill-Climbing Attacks”, IEICE Transactions, Vol.E93-D, No.3, pp.448-457, Mar. 2010

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.

Kyosuke Koisih, 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 model 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.

笠原和夫・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3報）－ピックフィードを伴う斜面の上りおよび下り加工の場合－」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.

笠原和夫・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）－等高線加工の場合－」 精密工学会誌，Vol.75，No.11，pp.1345-1349，2009.11

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 workpeice 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.

Y. Saito, H. Kohata, and H. Sano : “Effects of a bias voltage during hydrogenation on passivation of the defects in polycrystalline silicon for solar cells.”, Material Research Society Symposium Proceedings vol.1153, “Amorphous and polycrystalline thin-film silicon science and thecnology-2009”, Edited by A. Flewitt, J. Hou, A. Nathan, Q. Wang, S. Uchikoga, pp.353-358，2009.12

邦文題目：多結晶シリコン太陽電池内欠陥の水素パッシベーションにおけるバイアス電圧の効果

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-

lar cells.

Takashi SAKAI : “Fractal Analysis of Tensile Fracture Surfaces’ Geometrical Irregularity for Metallic Materials”, Journal of Optoelectronics and Advanced Materials, Rapid Communications, Vol.3, No.6, pp. 592-595, 2009.6

邦文題目：金属材料の引張破面性状不規則性の定量評価におけるフラクタル解析の適用

In this study, tensile tests were carried out on several carbon steels that had been heat-treated using various methods. Their fracture surfaces were observed using scanning laser microscopy. Based on the obtained digital data, an imaginary fracture surface was reconstructed in a three-dimensional (3D) space. Fractal analysis was applied to those 3D surfaces and the Richardson effect was confirmed in the surface irregularity. Finally, it was noted that the geometrical irregularity of the surface is well evaluated by combining the fractal dimension and an additional indices designated as indices of fracture surface nature.

酒井　孝・吉田慶介・小山純一・仲町英治：「高ひずみ付加した純アルミニウム単結晶材および多結晶材のスプリングバック特性」, 軽金属, Vol. 59, No. 4, pp. 179-184, 2009.4

本研究では，結晶粒微細化材の塑性加工特性，とくに曲げ加工特性に注目して実験を行い，従来から当該分野において最重要視されているスプリングバック特性について機械的性質の変化と関連付けて考察した。なお，結晶方位の異なる単結晶と多結晶材料微細化材のスプリングバック特性を調査したこれら一連の成果は，結晶方位とスプリングバックとの基礎データを連続的に蓄積したデータベースの構築に利用され，このデータベースを援用した高精度曲げ加工を実現するだけでなく高機能被加工材の創製に繋がる。

Tomoyuki KUMANO, Takashi SAKAI, Satoshi FUKUI, Hitoshi OMATA and Jun-ichi KOYAMA : “Material and Bending Properties of Several Grained Aluminum Alloys with Heat Treatment”, Book of Abstracts of 16th Asian Symposium on Ecotechnology (ASET16), p. 43, 2009.10

邦文題目：加工・熱処理履歴の異なる各種アルミニウム合金の特性評価と曲げ加工特性

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.

Ryuma TANIGUCHI, Takashi SAKAI, Satoshi FUKUI, Hitoshi OMATA and Jun-ichi KOYAMA : “Material and Springback Properties of Laser-Processed Materials”, Book of Abstracts of 16th Asian Symposium on Ecotechnology (ASET16), p. 44, 2009.10

邦文題目：レーザ加工材の材料特性とスプリングバック特性の調査

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-

cro-Vickers hardness distribution. Based on those results, we recognize properties of materials excised using the laser apparatus, producing highly accurate forecasts of springback.

Shingo INOUE, Takashi SAKAI, Satoshi FUKUI, Hitoshi OMATA and Jun-ichi KOYAMA : "Estimation of Material Characteristics for Various Materials", Book of Abstracts of 16th Asian Symposium on Eco-technology (ASET16), p. 45, 2009.10

邦文題目：難加工材のスプリングバック特性に及ぼす曲げ線圧縮の効果

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.

伊藤正英・柴田昌明：「移動観測対象に対するハンドアイロボットの追従視制御」，電気学会論文誌 D（産業応用部門誌），Vol.129，No.9，pp.930 - 937，2009.9

抄録：

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.

Sung-Hwan Shin, Takeo Hashimoto and Shigeko Hatano : "Automatic Detection System for Cough Sounds as a Symptom of Abnormal Health Condition", IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE, VOL.13, NO.4, pp.486-493, 2009.7

邦文題目：独居高齢者の健康異常時の自動検出システム

The problem of attending to the health of the aged who lives alone has became an important issue in developed countries. One way of solving the problem is to check their health condition by a remote-monitoring technique and support them with well-timed treatment. The purpose of this study is to develop an automatic system that can monitor a health condition in real time using acoustical information and detect an abnormal symptom. In this study, cough sound was chosen as a representative acoustical symptom of abnormal health conditions. For the development of the system distinguishing a cough sound from other environmental sounds, a hybrid model was proposed that consists of an artificial neural network (ANN) model and a hidden Markov model (HMM). The ANN model used energy cepstral coefficients obtained by filter banks based on human auditory characteristics as input parameters representing a spectral feature of a sound signal. Subsequently, an output of this ANN model and a filtered envelope of the signal were used for making an input sequence for the HMM that deals with the temporal variation of the sound signal. Compared with the conventional HMM using Mel-frequency cepstral coefficients, the proposed hybrid model improved recognition rates on low SNR from 5dB down to -10dB. Fi-

nally, a preliminary prototype of the automatic detection system was simply illustrated.