

学術論文抄録 2007 年発表

Localized and Non-Localized Solutions of q -Deformed Oscillators

Kozo Koizumi and Ikuo S. Sogami

Progress of Theoretical Physics, Vol. 117, No. 4, pp. 589–600 (2007)

Eigenfunctions of the Fock and non-Fock irreducible representations are explicitly derived for the q -deformed oscillator of Macfarlane and Dubna types. While the Fock representations are composed of localized functions, the non-Fock representations consist of nonlocal oscillating functions which are constructed for the first time in this paper. The concept of the q -Hermite functions is generalized to include both the Fock and non-Fock types in a unified manner.

フレーバー対称性のゲージ場理論とゲージ対称性の動的な秘匿機構 U(1)-ヒッグス場に由来するインフラトン

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数理解析研究所講究録 1565

RIMS 共同研究：量子解析におけるミクロ・マクロ双対性
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フレーバー物理学と宇宙の未知の構成要素を包括的に記述するための形式として、非半単純群 $G \simeq \mathrm{SU}(2) \times \mathrm{U}(1)$ のゲージ場理論を構築し、部分群 $\mathrm{U}(1)$ に関わるゲージ対称性を“動的に隠す(秘匿する)”機構 (Dynamical Concealing of Gauge Symmetry: DCGS) を定式化する。ヒッグス機構がゲージ対称性の自発的・瞬間的な破れを記述するのに対して、DCGS は時間経過に沿ってゲージ対称性を動的に隠す機構である。ヒッグス機構が適用できない初期宇宙の加速膨張を DCGS 機構で考察し、複素スカラー場から分離された実場がインフラトンの役割を演じること示す。

Mammalian N-glycan branching protects against innate immune self-recognition and inflammation in autoimmune disease pathogenesis.

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Marilyn G. Farquhar, and Jamey D. Marth

Immunity, 27–2, 308–320 (2007.8)

Autoimmune diseases are prevalent and often life-threatening syndromes, yet the pathogenic triggers

and mechanisms involved remain mostly unresolved. Protein asparagine linked- (N-) glycosylation produces glycan structures that substantially differ among the extracellular compartments of evolutionarily divergent organisms. Alpha-mannosidase-II (α M-II) deficiency diminishes complex-type N-glycan branching in vertebrates and induces an autoimmune disease in mice similar to human systemic lupus erythematosus. We found that disease pathogenesis provoking glomerulonephritis and kidney failure was nonhematopoietic in origin, independent of complement C3 and the adaptive immune system, mitigated by intravenous administration of immunoglobulin-G, and linked to chronic activation of the innate immune system. N-glycans produced in α M-II deficiency bear immune-stimulatory mannose-dependent ligands for innate immune lectin receptors, disrupting the phylogenetic basis of this glycomic recognition mechanism. Thus, mammalian N-glycan branching safeguards against the formation of an endogenous immunologic signal of nonself that can provoke a sterile inflammatory response in the pathogenesis of autoimmune disease.

Initiation of protein O glycosylation by the polypeptide GalNAcT-1 in vascular biology and humoral immunity

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Patrick Schaerli, Ulrich H. von Andrian, Klaus Ley, Dzung Le,
Lawrence A. Tabak, and Jamey D. Marth

Molecular and Cellular Biology, 27–24, 8783–8796 (2007.12)

Core-type protein O glycosylation is initiated by polypeptide *N*-acetylgalactosamine (GalNAc) transferase (ppGalNAcT) activity and produces the covalent linkage of serine and threonine residues of proteins. More than a dozen ppGalNAcTs operate within multicellular organisms, and they differ with respect to expression patterns and substrate selectivity. These distinctive features imply that each ppGalNAcT may differentially modulate regulatory processes in animal development, physiology, and perhaps disease. We found that ppGalNAcT-1 plays key roles in cell and glycoprotein selective functions that modulate the hematopoietic system. Loss of ppGalNAcT-1 activity in the mouse results in a bleeding disorder which tracks with reduced plasma levels of blood coagulation factors V, VII, VIII, IX, X, and XII. ppGalNAcT-1 further supports leukocyte trafficking and residency in normal homeostatic physiology as well as during inflammatory responses, in part by providing a scaffold for the synthesis of selectin ligands expressed by neutrophils and endothelial cells of peripheral lymph nodes. Animals lacking ppGalNAcT-1 are also markedly impaired in immunoglobulin G production, coincident with increased germinal center B-cell apoptosis and reduced levels of plasma B cells. These findings reveal that the initiation of protein O glycosylation by ppGalNAcT-1 provides a distinctive repertoire of advantageous functions that support vascular responses and humoral immunity.

Function of conserved aromatic residues in the Gal/GalNAc-glycosyltransferase motif of UDP-GalNAc:polypeptide N-acetylgalactosaminyltransferase 1.

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The FEBS Journal, 274–23, 6037–6045 (2007.12)

UDP-GalNAc:polypeptide N-acetylgalactosaminyltransferases (GalNAc transferases), which initiate mucin-type O-glycan biosynthesis, have broad acceptor substrate specificities, and it is still unclear how they recognize peptides with different sequences. To increase our understanding of the catalytic mechanism of GalNAc-T1, one of the most ubiquitous isozymes, we studied the effect of substituting six conserved aromatic residues in the highly conserved Gal/GalNAc-glycosyltransferase motif with leucine on the catalytic properties of the enzyme. Our results indicate that substitutions of Trp302 and Phe325 have little impact on enzyme function and that substitutions of Phe303 and Tyr309 could be made with only limited impact on the interaction(s) with donor and/or acceptor substrates. By contrast, Trp328 and Trp316 are essential residues for enzyme functions, as substitution with leucine, at either site, led to complete inactivation of the enzymes. The roles of these tryptophan residues were further analyzed by evaluating the impact of substitutions with additional amino acids. All evaluated substitutions at Trp328 resulted in enzymes that were completely inactive, suggesting that the invariant Trp328 is essential for enzymatic activity. Trp316 mutant enzymes with nonaromatic replacements were again completely inactive, whereas two mutant enzymes containing a different aromatic amino acid, at position 316, showed low catalytic activity. Somewhat surprisingly, a kinetic analysis revealed that these two amino acid substitutions had a moderate impact on the enzyme's affinity for the donor substrate. By contrast, the drastically reduced affinity of the Trp316 mutant enzymes for the acceptor substrates suggests that Trp316 is important for this interaction.

小画面ペン入力 UI におけるポインティング操作効率の評価

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ヒューマンインタフェース学会論文誌, 9-4, 67-74 (2007.11)

本研究では、画面サイズの小さい携帯電話上でのペン入力によるポインティング操作速度・精度を、ユーザ実験に基づいて PDA およびタブレット PC の場合と比較した。実験結果の考察により、小画面ペン入力 UI における画面設計、特に、サイズが比較的小さい選択対象オブジェクトに関して以下のような知見を得た。

(1) 携帯電話の場合には PDA および PC の場合に比べ、速度が有意に下回り、精度も多くの場合有意に下回る。したがって、携帯電話のような小画面上での選択対象オブジェクトの設計においては、PDA や PC 上での設計よりも難易度の上限を小さくすることが望ましい。ただし、今回の実験のように小サイズのオブジェクトの場合には距離の減少が精度向上には有効でなく、

サイズの増加が必要な可能性がある。

(2) 携帯電話の場合，設置・把持状態間の速度差が非常に大きくなる傾向にあり，設置状態であっても，速度が速いために精度が上がらない（この傾向は PDA では見られない）。したがって，設置・把持状態の検知に適応した UI 設計が可能となっても，「設置時なら把持時より精度良く操作できるはずでありその分サイズを下げられる」とは期待すべきでないと考えられる。

Detection of Layout-purpose TABLE Tags Based on Machine Learning

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HCI International 2007, Lecture Notes in Computer Science, 4556, 116–123,
Springer-Verlag (2007.07)

To evaluate the accessibility of webpages, it should be checked whether the pages include layout-purpose <table> tags. We propose a method for the detection that is based on machine learning. The proposed method derives a <table> tag classifier that deduces the purpose of a <table> tag: the classifier deduces whether a <table> tag is a layout-purpose one or a table-purpose one. We have developed a system that derives classification rules by ID3. Classification accuracy was evaluated by cross validation with 200 test data collected from the Web. Result of the evaluation revealed that 1) the tags can be roughly classified with attribute values of border, number of rows, number of tags that appear ahead of the <table> tag, and the nest of <table> tags (i.e., these attributes are more likely to appear in upper layers in decision trees), and 2) the accuracy rates are about 90% for the 200 test data.

Evaluation of P2P Information Recommendation Based on Collaborative Filtering

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HCI International 2007, Lecture Notes in Computer Science, 4552, 449–458,
Springer-Verlag (2007.07)

Collaborative filtering is a social information recommendation/filtering method, and the peer-to-peer (P2P) computer network is a network on which information is distributed on the peer-to-peer basis (each peer node works as a server, a client, and even a router). This research aims to develop a model of P2P information recommendation system based on collaborative filtering and evaluate the ability of the system by computer simulations based on the model. We have developed a computer simulator and tested simulations with several parameter settings. From the results of the simulations, recommendation recall and precision are evaluated. Findings are that the agents are likely to overly recommend so that the recall score becomes high but the precision score becomes low.

Tool for Detecting Webpage Usability Problems from Mouse Click Coordinate Logs

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HCI International 2007, Lecture Notes in Computer Science, 4550, 438–445,
Springer-Verlag (2007.07)

We propose a method that detects inconsistencies between user interaction logs of a task and desired sequences for the task based on mouse click coordinate logs. The proposed method models two successive clicks as a vector and thus a sequence of operation in a user/desired log as a sequence of vectors. A vector is from the i th clicked point to the $(i+1)$ th clicked point in the screen. To detect inconsistencies in user interactions and desired sequences, each vector from user logs is compared with each vector from desired logs. Our tool for the method is applied to experimental usability evaluation of ten business/public organization websites. The tool contributed to find 61% of the usability problems found by a manual method in much smaller amount of time.

上賀茂地域の活性化を目指した賀茂季鷹の歌碑建立の取り組みに関する考察

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京都産業大学総合学術研究所所報, 5, 37–48 (2007.7)

本論文では、1300 年以上の歴史がある上賀茂地域において、古くからの住民から新しい住民までが地元である上賀茂地域に愛着と誇りを持って協調していく礎を新たに作ることが、地域の活性化に必要なとの考えから、江戸末期の上賀茂が輩出した歌人である賀茂季鷹の歌碑を建立することを賀茂文化研究会は上賀茂自治連合会などに提案して、実現した。その経緯と生じた問題点、その対応方法などを考察し、今後の活動のあり方を検討した。また、地域への影響と外部からの評価を考察した。

賀茂季鷹の歌碑建立の取り組みによる上賀茂地域の活性化と 環境保全に関する考察

勝矢 淳雄*

環境衛生工学研究, 21-3, 167–170 (2007.7)

本論文では、種々の団体があり地域としての取り組みがなかなか難しい上賀茂地域で、賀茂季鷹の歌碑建立による地域の活性化のための取り組みについての課題と結果を考察した。社家の集まりである同族会からは協力が得られなかったことと、その一部の対応について明らかにし、今後の課題を提起した。

京都市において発現した急激な気温降下の事例の解析

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京都産業大学論集自然科学系列, 36, 69-84 (2007. 3)

1996 年から 2005 年までの 10 年間に於いて、京都市では 2 時間に 5.0°C 以上の気温降下が 121 回観測された。1 年間の発現回数は 8~19 回であり、年による差が大きい。月別には、最大が 7 月と 8 月の真夏で、この 2 か月で全体の 41% を占めており、次いで 5 月を中心とした春から初夏にかけての季節であり、したがって 2 つのピークが存在している。時刻別には、14~18 時台の時間帯に多く、全体の 82% を占めている。また、これらの中の 15 例は 20 分間に 5°C 以上という急激な気温降下があり、その 11 例は真夏の 7~8 月に、4 例は春から初夏の 4~6 月に発現している。最大瞬間風速を比較すると、4~6 月の場合の方が大きい。これはガストフロントが発生したためであると考えられる。

次に、春から初夏にかけて発現した 4 例のうち、1997 年 5 月 20 日と 2003 年 6 月 7 日の 2 例について事例解析を試みた。これには、地上気象観測記録（京都地方気象台と京都産業大学）、高層観測記録、レーダー画像および天気図を用いて、総合的な検討を行った。その結果、これらの事例における急激な気温降下は、降水セルの到達よりも前に発現していることから、発達した積乱雲の底から流出した冷気外出流によるものであり、また、気温降下直後の突風は冷気外出流の先端付近に発生したガストフロントによるものであると考えられる。

台風に起因した年最大瞬間風速の頻度の地理的分布と長期変化傾向について

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京都大学防災研究所研究集会 18K-01 報告書, pp. 24-27 (2007.3)

年最大瞬間風速の起因となる気象擾乱に関する調査によると、西日本における強風は、主として台風に起因しているのに対して、東日本や西日本日本海側では、台風以外の気象擾乱、すなわち、温帯低気圧、寒冷前線などの通過のさいに観測されている。したがって、南西諸島から西日本にかけては、日本海側を除いて、強風災害の対策は台風のみを想定すれば、ほぼ目的を達することができよう。一方、西日本の日本海側や東日本では、台風だけでなく、冬季から春にかけて襲う発達した温帯低気圧、寒冷前線、季節風なども考える必要がある。また、10 年ごとに見ると、台風起因頻度が増加し、また、年最大瞬間風速が増大してきている。これは、日本を襲う強い台風が増えてきていることを意味しているものと考えられる。

2006 年 5 月 30 日に京都市で発現した急激な気温降下の事例解析

藤井 健*

京都産業大学総合学術研究所所報, 5, 49-59 (2007. 7)

2006 年 5 月 30 日に京都産業大学において, 13 時 20 分から 5 分間の短時間に 5.7°C の急激な気温降下, 6.0 mm の激しい降雨が観測された. この現象について, 気象庁の各種気象観測資料を用いて解析を行った結果, 10 時 30 分ごろに兵庫県中部の山地で発生し, 発達しながら東進してきた降水セル群から流出した冷氣外流出によるものであった. この降水セル群は, 幅 20 km, 長さ 100 km の帯状に分布しており, 京都産業大学から南南西に 6 km 程度離れた京都地方気象台では, 降水セルの南端が通過しただけであり, 降雨は 0.0 mm であった.

次に, アメダス観測点の観測値を用いて, この降水セル群の通過時に観測された 20 分間気温降下最大値の分布を調べたところ, 京都産業大学の 7.5°C が最大の気温降下であった. また, 京都市付近では, 大阪湾からの南西の風と琵琶湖からの東よりの風が水平方向に収束しており, 接近した積乱雲をさらに発達させる状況にあった.

このときの総観場の状況によると, 地上では, 低気圧の後面に当たっていた. 500 hPa 面においては日本海北部に寒冷低気圧があり, その西側で, 大陸から乾燥した寒気が流入しており, 対流不安定の成層状態にあった.

台風に起因した年最大風速の頻度の地理的分布と長期変化傾向について

藤井 健*

自然災害科学, 26-3, 267-277 (2007.11)

気象庁管轄の 150 観測地点で 1966 ~ 2005 年の 40 年間に観測された年最大風速と年最大瞬間風速について, 発現の原因が台風か, あるいはそれ以外の気象擾乱によるのかを判別した. その結果, 両風速とも, 台風に起因した比率は, 南西日本では, 内陸や日本海側を除いて, おおむね 50% を超えており, とくに, 南西諸島から九州南端までは 80% を超えている. 北東日本を中心とした他の地域では 50% 以下である.

次に, 10 年ごとの 4 つの期間 (古い順に期間 I, II, III, IV) に分けて調べた.

- (1) 発現月については, 両風速とも, また全期間とも, 8 ~ 9 月に一つのピークがあり, ほとんどは台風に伴って発現している. 一方, 2 ~ 4 月に, もう一つのピークがあり, これは台風以外の擾乱により発現している.
- (2) 発現したときの風向については, 最大風速は南南東と西の 2 つのピークがあるが, 最大瞬間風速は西のピークのみである.
- (3) 発現したときの風速については, 期間 IV において, 最大風速 20 m/s が超える比率が 24% にまで, 最大瞬間風速 35 m/s を超える比率が 31% にまで増加する.

この研究において得られた結果は, 強風災害の減少対策にとって, 局地的特性を生かしたプログラムにおいて応用できるものと考えられる.

Function of conserved aromatic residues in the Gal GalNAc-T motif of UDP-GalNAc: polypeptide N-acetylgalactosaminyltransferase 1

Mari Tenno, Aki Saeki, Åke P. Elhammer, and Akira Kurosaka*

FEBS J., 274–23, 6037–6045, (2007, 12)

Polypeptide N-acetylgalactosaminyltransferases (GalNAc-transferases), which initiate mucin-type O-glycan biosynthesis, have broad acceptor substrate specificities, and it is still unclear how they recognize peptides with different sequences. To increase our understanding of the catalytic mechanism of GalNAc-T1, one of the most ubiquitous isozymes, we studied the effect of substituting six conserved aromatic residues in the highly conserved Gal/GalNAc-T motif, with leucine, on the catalytic properties of the enzyme. Our results indicate that substitutions of Trp302 and Phe325 have little impact on the enzyme function and that substitutions of Phe303 and Tyr309 could be made with only limited impact on the interaction(s) with donor and/or acceptor substrates. By contrast, Trp328 and Trp316 are essential residues for enzyme functions since substitution with leucine, at either site, lead to complete inactivation of the enzymes. The roles of these tryptophan residues were further analyzed by evaluating the impact of substitutions with additional amino acids. All evaluated substitutions at Trp328 resulted in enzymes that were completely inactive, suggesting that the invariant Trp328 is essential for enzymatic activity. Trp316 mutant enzymes with non-aromatic replacements were again completely inactive, while two mutant enzymes containing a different aromatic amino acid, at position 316, showed low catalytic activity. Somewhat surprisingly, a kinetic analysis revealed that these two amino acid substitutions had a moderate impact on the enzyme's affinity for the donor substrate. By contrast, the drastically reduced affinity of the Trp316 mutant enzymes for the acceptor substrates suggests that Trp316 is important for this interaction.

Localized and Non-Localized Solutions of q-Deformed Oscillators

Kozo Koizumi* and Ikuo S. Sogami*

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Eigenfunctions of the Fock and non-Fock irreducible representations are explicitly derived for the q-deformed oscillators of the Macfarlane and Dubna types. While the Fock representations are composed of localized functions, the non-Fock representations consist of nonlocal oscillating functions which are constructed for the first time in this paper. The concept of the q-Hermite functions is generalized to include both the Fock and non-Fock types in a unified manner.

Exact spectrum of the XXZ open spin chain from the q -Onsager algebra representation theory

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J. Stat. Mech. P09006 (2007)

The transfer matrix of the XXZ open spin chain with general integrable boundary conditions and generic anisotropy parameter (q is not a root of unity and $|q| = 1$) is diagonalized using the representation theory of the q -Onsager algebra. Similarly to the Ising and superintegrable chiral Potts models, the complete spectrum is expressed in terms of the roots of a characteristic polynomial of degree $d = 2N$. The complete family of eigenstates are derived in terms of rational functions defined on a discrete support which satisfy a system of coupled recurrence relations. In the special case of linear relations between left and right boundary parameters for which Bethe-type solutions are known to exist, our analysis provides an alternative derivation of the results of Nepomechie et al and Cao et al. In the latter case the complete family of eigenvalues and eigenstates splits into two sets, each associated with a characteristic polynomial of degree $d < 2N$. Numerical checks performed for small values of N support the analysis.

Accurate numerical solutions of the time-dependent Schrödinger equation

Wytse van Dijk and F. M. Toyama*

Physical Review E, Vol. 75 (2007) 036707-1-036707-10.

We present a generalization of the often-used Crank-Nicolson CN method of obtaining numerical solutions of the time-dependent Schrödinger equation. The generalization yields numerical solutions accurate to order $(\Delta x)^{2r-1}$ in space and $(\Delta t)^{2M}$ in time for any positive integers r and M , while CN employ $r = M = 1$. We note dramatic improvement in the attainable precision circa ten or greater orders of magnitude along with several orders of magnitude reduction of computational time. The improved method is shown to lead to feasible studies of coherent-state oscillations with additional short-range interactions, wave-packet scattering, and long-time studies of decaying systems.

Transmission-reflection problem with a potential of the derivative form of the delta function

F. M. Toyama* and Y. Nogami

Journal of Physics A: Math. and Theor., Vol. 40 (2007) F685–F690.

Regarding the quantum mechanical transmission-reflection problem in one dimension with a potential of the form of the derivative of the Dirac delta function $\delta'(x) = d\delta(x)/dx$, Christiansen *et al.* recently found that, depending on how $\delta'(x)$ is interpreted, there can be a resonance which leads to partial transmission. This is in contrast to the earlier consensus that such a potential allows no transmission. The $\delta'(x)$ can be regarded as the narrow-width limit of a certain function $\Delta'(x)$ of a finite range. Christiansen *et al.* assumed a rectangular function for $\Delta'(x)$. We examine various other forms and how the resonance depends on the shape of $\Delta'(x)$. We also present some general observations related to the ‘threshold anomaly’.

Simple method of eliminating blurs based on Lane and Bates algorithm

S. Aogaki, I. Moritani, T. Sugai, F. Takeutchi* and F. M. Toyama*

Proceedings of IEEE Fourth Intern. Conf. on Info. Tech. & Appl. 2007,
Vol. 1 pp. 227–229, 2007.

A simple search method for finding a blur convolved in a given image is presented. The method can be easily extended to large blurs. The method has been experimentally tested with a model blurred image.

Novel scheme for blind deconvolution: Multi-point form

S. Aogaki, I. Moritani, T. Sugai, F. Takeutchi* and F. M. Toyama*

IEEE Fourth Intern. Conf. on Info. Tech. & Appl. 2007, Vol. 1 pp. 230–233, 2007.

In our third paper we presented a novel scheme for the Lane-Bates method for blind deconvolution. The scheme is given in the form of conditions on derivatives of zeros of the z -transform of a given image. In the present paper, we give a different version of the scheme. This time the condition is expressed in terms of zeros evaluated at multiple points.

Novel scheme for blind deconvolution: Derivative form

S. Aogaki, I. Moritani, T. Sugai, F. Takeutchi* and F. M. Toyama*

IEEE Fourth Intern. Conf. on Info. Tech. & Appl. 2007, Vol. 1 pp. 211–215, 2007.

When a blurred image is presented, the Lane-Bates method of blind deconvolution makes it possible to recover the original image without prior knowledge of the point-spread mechanism that caused the blurring. The method utilizes the zeros of the z -transform of the given image. Its implementation, however, requires highly nontrivial analysis of the zeros. We have developed a novel scheme that considerably simplifies the analysis of the zeros. The scheme is particularly powerful when the blurs have multiple structures as we illustrate. There are two versions of the scheme. In this paper we present one of them which is in the form of conditions on derivatives of a certain function that is related to the zeros of the z -transform.

Dvelopment of a High-resolution Fast Gamma-ray Imager for the New-generation PET III

S. Aogaki, H. Kotaka, I. Moritani, F. Takeutchi* and F. M. Toyama*,

先端科学技術研究所所報, 6 (7) (2007) 65–82.

The disappearance of the air layer between scintillator crystals due to their sticking seems harmful. To avoid this phenomenon, an insertion of black block paper is tried and the effect was studied. The result seems positive. But we need to look for a better material which is light, thin, solid yet not sticky.

Novel Scheme for Lane-Bates' blind deconvolution: Determinant conditions for the zeros of blurs and a simple algorithm for eliminating blurs

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先端科学技術研究所所報, 6 (7) (2007) 83–103.

The Lane-Bates method of blind deconvolution makes it possible to analytically recover the original image without prior knowledge of blurs that should be convolved in a given image. The method utilizes the zeros of the z -transform of the given image. Its implementation, however, requires highly nontrivial analysis of the zeros. We have developed a novel scheme that considerably simplifies the analysis of the zeros. We have developed two versions of the scheme, i.e., determinant conditions (DCs) for the zeros of blurs and a search algorithm (SA) of blur images. The DCs consist of two forms, i.e., a derivative form and

a multi-point form. The derivative form is given as a determinant form of conditions on derivatives of the zeros of assumed blurs that can be evaluated by using whole zeros of the z-transform of a given image. On the other hand, the multi-point form is given as a determinant form of conditions on the zeros themselves of assumed blurs that are evaluated at multiple points. The scheme is particularly powerful when the blurs have multiple structures as we illustrate. The SA is given as a form of simultaneous equations for blur elements of an assumed blur. The method is powerful when we try to find a single blur. This method is robust for noises. These methods have been experimentally tested with model blurred images and shown to be powerful. In this paper we present them and illustrate how they are useful for the Lane-Bates' blind deconvolution.

喫煙による抗体産生抑制

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臨床免疫・アレルギー科, 48: 673-681, 2007

喫煙による抗体産生抑制と肺胞マクロファージが関与した抗原特異的(抗原提示), 抗原非特異的な B リンパ球との相互反応に及ぼす影響に関する詳細な報告は少ないのが現状である。そこで, 喫煙による抗体産生への影響について, 肺の免疫系において重要な役割をしている肺胞マクロファージと抗体産生の関係について検討した。喫煙により抗体産生機能は低下しており, 特に抗体産生の初期の段階で抑制が認められ, 後期の段階では抑制されない。この抑制の機構には, 肺胞マクロファージが関与し, 喫煙による肺胞マクロファージの抗原取り込みの抑制, 次に引き続く抗原提示機能の低下, 抗原提示に関連した B7, クラス II 分子の発現低下が関与していることが示された。また, 喫煙は抗体産生の初期である B 細胞の増殖反応の抑制にも関係し, この抑制は活性酸素消去剤により回復された結果から, 抑制には喫煙により肺胞マクロファージから過剰産生された活性酸素の関与が示唆された。一方, 既に抗体を産生している細胞には, 喫煙による影響はないことから, 喫煙は肺胞マクロファージの抗原取り込み, 抗原提示及び B 細胞の初期増殖反応に抑制的に働き, その結果抗体産生を抑制し, 易感染性を増加させる可能性が考えられる。しかし, 喫煙による抗体産生抑制と肺胞マクロファージが関与した抗原特異的(抗原提示), 抗原非特異的な B リンパ球との相互反応に及ぼす影響に関する詳細な報告は少ないのが現状である。今後, この抑制機構の詳細な解明が必要である。

Bronchoalveolar lavage in idiopathic interstitial lung diseases.

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Semin. Respir. Crit. Care Med.: 28 (5): 496-503. 2007.

Bronchoalveolar lavage (BAL) is useful for diagnosing various interstitial lung diseases (ILDs) and monitoring ILD during treatment. The ability to detect specific agents or substances by using BAL is especially helpful in determining whether idiopathic ILD has a background causality. BAL in combination

with other intensive examinations may enable the definitive diagnosis of an idiopathic ILD. Among the idiopathic ILDs of concern, this article focuses on idiopathic interstitial pneumonia (IIP) and cryptogenic organizing pneumonia (COP). IIP and COP are classified together as idiopathic interstitial pneumonia (IIP), an integrated clinicoradiographic pathological disease entity. BAL has identified two points important for differentiating the disease entity: a paucity of lymphocytes appears in the BAL fluid of patients with idiopathic pulmonary fibrosis (IPF), and lymphocytosis with a decreased CD4:CD8 ratio appears in patients with COP. These findings can be useful, in combination with high-resolution computed tomographic (HRCT) data, for selecting a favorable treatment option. On the other hand, these rules cannot be applied to IP associated with collagen vascular disease (CVD). Furthermore, some IIP patients may manifest features of CVD during the clinical course after the detection of IP (interstitial pneumonia). Thus the definite role of BAL cell profiles remains to be determined.

大垣市金生山と石垣島真栄里に分布する暗赤色土の性状と土壌母材の均一性

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ペドロジスト, 51-2, 56-67 (2007.12).

石灰岩上に分布する大垣市金生山と石垣島真栄里の暗赤色土の性状から, その母材をを検討した。金生山と真栄里の石灰岩の不溶性残渣, 両土壌の石英の酸素空格子信号強度(ESR 法), 理化学性, 粘土鉱物組成などから, 両土壌とも母材は均一でなく, 金生山土壌は風成塵を主要母材とし, 石灰岩とアカホヤテフラとの影響が見られた。真栄里土壌は, 風成塵と石灰岩が主要母材となっていると考えられた。そして, 金生山土壌は温暖帯気候下, 真栄里土壌は亜熱帯気候下での土壌生成作用を受けて生成した暗赤色土と推定した。

Origin of chromatic features in multiple quasars

—Variability, dust, or microlensing—

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Astronomy and Astrophysics, 478-1, 95-109 (2008.01)

Aims: In some of lensed quasars, color differences between multiple images are observed at optical/near-infrared wavelengths. There are three possible origins for the color differences: intrinsic variabilities of quasars, differential dust extinction, and quasar microlensing. We examine how these possible scenarios can reproduce the observed chromaticity.

Methods: We evaluate how much the color difference between multiple images can be reproduced by the scenarios with realistic models; (i) an empirical relation for intrinsic variabilities of quasars, (ii) empirical relations for dust extinction and theoretically predicted inhomogeneity in galaxies, or (iii) a theoretical model for quasar accretion disks and magnification patterns in the vicinity of caustics.

Results: We find that intrinsic variabilities of quasars cannot be a dominant source responsible for

observed chromatic features in multiple quasars. In contrast, either dust extinction or quasar microlensing can reproduce the observed color differences between multiple images in most of the lensed quasars. Taking into account the time interval between observations in different wavebands in our estimations, quasar microlensing is a more realistic scenario to reproduce the observed color differences than dust extinction. All the observed color differences presented in this paper can be explained by a combination of these two effects, but monitoring observations at multiple wavebands are necessary to disentangle them.

Optimization of the Marker-based Procedures for Pyramiding Genes from Multiple Donor Lines: I. Schedule of Crossing between the Donor Lines

T. Ishii and K. Yonezawa*

Crop Science 47: 537–546 (2007. 3)

Recent exploitation of DNA markers of desirable trait genes facilitates construction of high-degree gene pyramided lines via assembling markers from multiple donor lines. In such a program, a plant that has all the target markers in a heterozygous state must be produced first. Efficient procedures for that are discussed. When pyramiding the genes onto the genetic background of a particular recipient line, the backcross should be performed separately for each donor prior to the crossing between the donors. The plants produced through the backcross should be crossed in a schedule with structure and disposition of the plants as symmetric as possible. When four such plants, A, B, C and D, are produced, for instance, they should be crossed in a schedule like $(A \times B) \times (C \times D)$ in which the number of target markers of A plus B should be as similar as possible to that of C plus D. Ideal-type schedules in the presence of four to eight donors are presented. A contrastingly different guideline applies when the donors themselves are crossed without the backcross; they should be crossed in a schedule with completely tandem structure in which donors with fewer target markers enter the schedule in earlier stages. The disposition of donors in the schedule should be modified in the presence of linked or redundant markers. Donors should be disposed in a pattern to minimize the occurrence of repulsion linkages. Formulae for the modification under a high redundancy are presented.

Optimization of the Marker-based Procedures for Pyramiding Genes from Multiple Donor Lines: II. Strategies for selecting the objective homozygous plant

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Crop Science 47: 1878–1886 (2007. 8)

For extended application of marker-based plant breeding, strategies are discussed for selecting a high-degree gene-pyramided line from among progeny of a multi-parentally produced heterozygous plant (root genotype). A strategy with combined use of haplo-diploidization and crossing between selected plants will be highly efficient; selection starts with haplo-diploidized plants raised from the root genotype, and in the absence of a plant with the objective marker genotype, two plants with the best complementary genotypes are crossed to produce a hybrid, which in turn is haplo-diploidized for the next round of selection. In this strategy, even a plant having as many as 20 target markers can be obtained at an almost perfect certainty in about three rounds of selection with a maximum of 200 tested plants per round. When haplo-diploidized plants are unavailable, a plant with the most promising marker genotype should be selected and self-fertilized in each generation, or in the absence of any promising plant, two plants with the best complementary genotypes are crossed for the next round of selection. In this strategy, the number of tested plants in the first two generations counts when the markers are codominant, whereas the rounds of selection counts when the markers are dominant. Of various supplementary measures for this strategy, backcrossing the root genotype with one of the donors could be useful when the donor has more than 70% of all targeted markers.

Corticotropin Releasing Factor: A Role in Attentional State Transitions and the Genesis of Quasi-Attractors during Perception

H. Fujii*, K. Aihara & I. Tsuda

Proceedings of the 1st International Conference on Cognitive Neurodynamics—ICNN2007, Springer Lecture Note in Computer Science 2008 (to appear).

The Role(s) of corticotropin releasing factor (CRF) in perception and conscious flow is largely unknown. The attention hypothesis may well be established experimentally. The aim of this talk is to give a small review, and then try to extend further the arguments, on the role of corticotropin releasing factor in perception from a dynamical systems standpoint, to search for its possible role in perceptual *binding*, and in the transient genesis of quasi-attractors through the mechanism of changing synchrony

Corticopetal Acetylcholine: Possible Scenarios on the Role for Dynamic Organization of Quasi-Attractors

H. Fujii*, K. Aihara & I. Tsuda

Proceedings of the International Conference on Neural Information Processing—ICONIP 2007, Springer Lecture Note in Computer Science 2008 (to appear).

A new hypothesis on a possible role for the corticopetal acetylcholine (ACh) is provided from a dynamical systems standpoint. The corticopetal ACh helps to transiently organize a global (inter- and intra-cortical) quasi-attractors via gamma range synchrony when it is behaviorally needed as top-down attentions and expectation.

Chaos Reality in the Brain

I. Tsuda & H. Fujii*

J. Integrative Neuroscience 6 (2007), 309–326.

We review the basic concepts of dynamical systems in the first half of this article. In particular, we deal with the origin of chaos in relation with ergodic theory in statistical mechanics. We emphasize that chaos can also appear in high-dimensional phase space. In the second half of the article, we focus on cortical transitory dynamic behaviors observed during task-related actions of animals, and provide a dynamical interpretation of such transitory behaviors in terms of chaotic itinerancy.

Bifurcations in two-dimensional Hindmarsh-Rose type model

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Int. J. of Bifurcation and Chaos 17 (2007), 985–998.

We analyze a two-dimensional Hindmarsh–Rose type model exhibiting properties of both Class 1 and Class 2 neurons. Although the system is two-dimensional and contains only four parameters, the obtained bifurcation diagrams show that the bifurcation structure satisfies conditions for emergence of both features with constant stimuli.

ユビキタスホーム：日常生活支援のための住環境知能化への試み

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ロボット学会論文誌, Vol. 25, No. 5, pp. 10–16 (2007.5)

ユビキタス技術の中でも，特に最近注目を集めている，住環境の知能化について，情報通信研究機構において進めた「ゆかりプロジェクト」の成果を中心にして，特に家庭における日常生活支援のための取り組みについて論じた．

親和行動導入による実用的ホームロボットインタフェース 音声誤認識を許容する親和行動

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ヒューマンインタフェース学会論文誌，Vol. 8, No. 2, pp. 45–51 (2007.5)

実用性と親和性の融合を図るロボットインタフェースとして，乳幼児を参考にした発話・注視動作による親和行動を実装した．そして TV の ch. 切替などの実行行動に親和行動を加えた場合の，親和性と音声誤認識の許容度を評価し，親和行動の有効性があることを明らかにした．

家庭内ユビキタス環境における対話ロボットの実稼動実験と対話戦略の評価

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情報処理学会論文誌，Vol. 48, No. 5, pp. 2023–2031 (2007.5)

家庭内ユビキタス環境におけるロボットインタフェースの対話システムを，生活実証実験を通じて評価した．ロボットの対話戦略としては，ユーザ間対話への割り込みや音声の誤認識や雑音による偶発的なキーワードの一致により，ロボットから対話を開始することで，ユーザの潜在的なニーズを引き出したりユーザのシステムに対する理解を促進させたりする，

Human-Robot Interaction in the Home Ubiquitous Network Environment

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Akihiro Kobayashi, Kenzabro Miyawaki, Masatsugu Kidode

12th International Conference on Human-Computer Interaction, pp. 990–997 (2007.7)

The situation recognition ability of the robot is enhanced by connecting a home ubiquitous network and conversational robots. The situation explanation ability of the robot is also enhanced by acquiring information through the network. The new development of the human robot interaction can be expected

in total. In this paper we describe a prototype system that is developed in the experimental house based on such a concept. Then, the study of the actual proof experimental life in the house is discussed.

Gravitational sedimentation effect of colloidal silica crystals in binary systems of titanium dioxide and silica particles

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Phase Transitions, 80-8, 875–886, (2007.8)

Colloidal crystals can be formed of silica particles while those of titania particles are not known under the normal gravitational field, because of their high specific gravity. We found by the Kikuchi-Kossel diffraction technique that, when silica particles (diameter: $D = 170 \text{ nm}$; density: $\rho = 2.2 \text{ gcm}^{-3}$) are mixed with titania particles ($D = 127 \text{ nm}$; $\rho = 3.9 \text{ gcm}^{-3}$), colloidal crystals are formed. Colloidal crystals started out with body-centered-cubic structure and changed to face-centered-cubic structures after about 60 days. Transitions began from the bottom of the container. Thus the transitions are considered to be due to gravitational sedimentation. It is significant that the crystal growth process, which has not been observed in one-component dispersions of the silica particles, was found using titania particles with a wide range of the practical applicability.

コロイド合金結晶の構造解析と秩序形成過程

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京都産業大学総合学術研究所所報, 第5号 85–95 平成19年7月

コロイド結晶・コロイド合金の構造解析が, マルチビーム Ar レーザー光を用いて, コッセル線回折法で行われた. その結果, コロイド結晶の秩序形成過程において新しく六方最密構造をとる過程が存在することが発見された. また, いくつかのミラー指数のコッセル線の線幅をレーザー光の波長を変えて測定し, 線幅の波長依存性を調べることで, ミラー指数に対応する分極率のフーリエ係数が求められ, より精密な構造解析が可能となった.

On p-adic families of Hilbert cusp forms of finite slope

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Journal of Number Theory 123 (2007) 363–387

Let p be a prime number and F a totally real field. In this article, we obtain a p-adic interpolation of spaces of totally definite quaternionic automorphic forms over F of finite slope, and construct p-adic

families of automorphic forms parametrized by affinoid Hecke varieties. Further, as an application to the case where $[F:Q]$ is even, we obtain p -adic analytic families of Hilbert eigenforms having fixed finite slope parametrized by weights. This is an analogue of Coleman's analytic families in [R.F.Coleman, p -Adic Banach spaces and families of modular forms, *Invent. Math.* 127 (1997) 417-479].