4．利用者論文一覧表

注：(1) この一覧は，平成 19 年 1 月から 19 年 12 月までの間に提出された利用者の論文別刷のうち，学協会誌，論文集等に掲載されたものを収録した。口頭発表による論文集別刷および原稿プリント等は省いてある。
(2) 共筆者がある場合は，当該別刷を提出した利用者に＊印を付した。
(3) 掲載順序は，おおむね利用者の登録番号順による。

(1) *Yoshio Muroga, Kentaro Hayashi, Mitsuhiro Fukunaga, Tadaya Kato, Shigeru Shimizu, Kimio Kurita：**Change of the persistence lengths in the conformational transitions of pullulan- and amylose-tricarbanilates**, Biophysical Chemistry, Vol.121, pp.96 ～ 104 (2006)

ABSTRACT：With raising temperature in the domain of 20 to 60℃, the intrinsic viscosity [η] for pullulan-tricarbanilate PTC and amylose-tricarbanilate ATC in solutions was found to decrease, indicating that they exhibited thermal-induced conformational transition from expanded form to compact form. The persistence length P_l of the chains, evaluated with small-angle X-ray scattering, has also decreased as the temperature is raised and, moreover, it significantly depended on the solvents employed, whereas P_l of pullulan, having no carbanilate groups, has exhibited neither temperature- nor solvent-dependence. The temperature dependence of [η] for PTC and ATC was well elucidated in terms of the temperature-dependent P_l with the wormlike chain model. From these results, it is suggested that intramolecular hydrogen-bonds would be formed between carbanilate groups neighboring along the backbone chain, but they are gradually and cooperatively collapsed as the temperature is raised, inducing the conformational transition.

(2) *Hitoshi Nakahara, Tsuyoshi Oya, Yahachi Saito, Ayahiko Ichimiya：**RHEED Rocking Curve Analysis of Si(111)$\sqrt{3}\times\sqrt{3}$-Ag Surface Phase Transition at Low Temperature**, e-Journal of Surface Science and Nanotechnology, Vol.4, pp.414 ～ 418 (2006)

ABSTRACT：Si(111)$\sqrt{3}\times\sqrt{3}$-Ag surface structural phase transition from honeycomb chained triangles (HCT) structure to inequivalent triangles (IET) structure is investigated using reflection high-energy electron diffraction (RHEED) rocking

curves. Rocking curves are measured during spontaneous heating process of a cooled（～120 K）sample up to room temperature. The rocking curves were analyzed using many-beam dynamical RHEED calculations with three kinds of structural models, HCT（Ag triangle stays at mirror symmetry position), IET（Ag triangle rotates by 6 degrees）and rotating-HCT（r-HCT; Ag atoms are randomly rotating between ±6° which maintains the mirror symmetry）structures. At room and low temperatures, r-HCT and IET structures give the best results respectively. Rocking curves between room and low temperatures are also reproduced by mixing of r-HCT and IET structures and the mixing ratio changes almost linearly with substrate temperature. It is obtained that r-HCT coverage is almost 100 % at room temperature and IET coverage is about 60 % at 120 K. It is also found that mixing ratio of IET/r-HCT structure meets 0.5 at about 150 K which is known as a transition temperature in previous reports.

（3） * 加藤内藏進，池田祥一郎，阿部加奈：**東アジアの季節サイクルや日々の気象に注目した最終氷期頃の気候環境の理解へ向けて**，環境制御，第 28 号，pp.17 ～ 27（2006）

ABSTRACT：Regional climate system in East Asia shows the characteristic seasonal cycle affected by the Asian monsoon with various types of its sub-systems. The seasonal cycle there is also related greatly to behaviors of the frontal zones which are the boundaries of these subsystems. Since the variation of global-scale environment such as the global warming influences on each monsoon sub-system in rather different manner, it is necessary to understand the joint effects of these subsystems, in order to predict the regional climate change in East Asia in the global warming. In such research, it would be also useful to examine the features in the ice age, as an opposite extreme situation against the global warming. Thus the present paper will discuss some viewpoints in investigating the regional climate in the Last Glacial Maximum with attention to the seasonal cycle and daily meteorological systems.

Key words: Climate in East Asia, Seasonal cycle, Frontal zone, Last Glacial Maximum

（4） 加藤内藏進：**岡山と高知の日降水量差の季節進行の気候学的特性－瀬戸内型気候と降水に関連して－**，地域地理研究，第 12 巻（2006）

ABSTRACT： 本研究では，「季節進行の中での日々の現象に伴うどのような降水量分布がどのような頻度で出現することを反映して，期間全体の降水量分布がどう特徴づけられるのか」という視点で瀬戸内型気候を特徴づける過程を見直すための最初のステップとして，四国太平洋側の高知から瀬戸内側の岡山での値を引いた日降水量差の統計解析を，1971 ～ 2001 年のデータに基づき行なった。その結果，高知の降水量から岡山の値

を引いた差は，6月後半～7月前半には多少減少するものの，4月～9月を通して大きな値であった。一方，月降水量差の標準偏差は，高知の月降水量の大きな年々変動を反映して6月以降に大きな値を示すようになり，9月頃に特に大きくなった。4～5月頃には，高知の日降水量が岡山の降水量を0～50mm/日の範囲で上回る日が毎年高頻度で出現する。その結果，両地点間での大きな総降水量差が生じていた。一方，8～9月には，高知の降水量が岡山の降水量を50mm/日以上も大きく上回る日が，2ヶ月あたり3日強の割合で出現することに伴って，高知と岡山との間で期間全体での大きな総降水量差がもたらされていた。また，50mm/日を超える降水量差をもたらす日数の年々変動も比較的大きいことにより，高知と岡山の8～9月における総降水量差の大きな年々変動をもたらしていることが明らかとなった。このように本研究は，2ヶ月間で数回起きるような降水量差の大きな日の出現が，8～9月の両地点間の総降水量差やその年々変動へ大きく寄与するなど，瀬戸内型気候のメカニズムを今後詳細に見直す際の興味深い糸口を提示している。

(キーワード) 瀬戸内型気候，日降水量，季節変化，日本付近の気候システム，岡山と高知の降水量差

(5) Koji Yamauchi, *Yukiharu Ohsawa：**Shock formation processes in colliding two collisionless plasmas in a magnetic field**, PHYSICS OF PLASMAS, Vol.14, No.053110-1～10 (2007)

ABSTRACT：Interactions of exploding and surrounding plasmas are analyzed with theory and particle simulations for the case in which the initial velocity $\boldsymbol{v}_0$ of the exploding plasma is perpendicular to the weak external magnetic field B_0; because of the fast $\boldsymbol{v}_0$ and weak $\boldsymbol{B}_0$, the gyroradius v_0/Ω_i is much longer than shock widths. After the penetration of the exploding ions, the electric field induced by the cross-field plasma motion quickly accelerates the surrounding ions in the direction perpendicular to $\boldsymbol{v}_0$ and $\boldsymbol{B}_0$. Owing to the magnetic force, however, the surrounding ions that were once overtaken by the exploding ions can pass them later. Because the electron guiding centers move with the $\boldsymbol{E}\times\boldsymbol{B}$ drift, the two kinds of electrons are not mixed. Further, because of the deceleration of the exploding ions in the front layer, the plasma density and magnetic-field strength go up there. This field reflects the surrounding ions forward and exploding ions backward. This generates two large pulses, which then develop into forward and reverse shock waves. Up to the generation of the two pulses, the time and length scales are basically determined by $\boldsymbol{v}_0$ and B_0.

(6) Masatoshi SATO, *Yukiharu OHSAWA：**Evolution of Oblique Shock Waves in**

a Reversed External Magnetic Field and Associated Electron Acceleration, Journal of the Physical Society of Japan, Vol.76, No.10, pp.104501-1 ～ 7 (2007)

ABSTRACT : Electron acceleration caused by small pulses in oblique shock waves in a reversed external magnetic field is studied with theory and particle simulations. Simulations show that after a shock wave has passed a neutral sheet, across which the external magnetic field is reversed, a new density pulse is produced in front of the original shock wave. This pulse quickly evolves into a shock wave with the magnetic polarity opposite to that of the original shock wave. In this secondary shock wave, two types of small pulses are generated. One is compressive, and the other is field reversed. In these small pulses, electron acceleration to ultrarelativistic energies is observed. A theoretical analysis is made on the electron acceleration in field-reversed small pulses that propagate obliquely to a magnetic field. It is confirmed that the simulation results are consistent with the theoretical predictions.

(7) Mieko TOIDA, Hiroyuki HIGASHINO, *Yukiharu OHSAWA : **Effect of Ion Composition on Magnetosonic Waves**, Journal of the Physical Society of Japan, Vol.76, No.10, pp.104502-1 ～ 6 (2007)

ABSTRACT : The propagation of the two types of fast magnetosonic waves, i.e., low- and high-frequency modes, in a two-ion-species plasma is studied theoretically and numerically. It is analytically found that the KdV equation for the low-frequency mode is valid for amplitudes $\varepsilon < 2\Delta_\omega$, where $\Delta_\omega = (\omega_{+0} - \omega_{-r})/\omega_{+0}$ with ω_{+0} being the cutoff frequency of the high-frequency mode and ω_{-r} the resonance frequency of the low-frequency mode; Δ_ω is given as a function of the density ratio and cyclotron frequency ratio of two ion species. It is then suggested that nonlinear coupling between the two modes can occur if $\varepsilon > 2\Delta_\omega$. With electromagnetic particle simulations, the evolution of the low- and high-frequency-mode pulses is investigated for various density and cyclotron frequency ratios and is compared with theoretical predictions. In particular, it is shown that high-frequency-mode pulses are generated from a longwavelength low-frequency-mode pulse if its amplitude ε exceeds $2\Delta_\omega$.

(8) Seiichi Takahashi, *Yukiharu Ohsawa : **Parallel electric fields in nonlinear magnetosonic Waves**, PHYSICS OF PLASMAS, Vol.14, pp.112305-1 ～ 8 (2007)

ABSTRACT : The electric field parallel to the magnetic field, $E_\parallel$, in nonlinear magnetosonic waves is studied theoretically and numerically. In the calculation of $E_\parallel$ based on the conventional reductive perturbation method, the terms related to the magnetic pressure cancel, and $E_\parallel$ is proportional to the electron temperature T_e.

With a modified perturbation scheme assuming that the wave amplitude is in the range $(m_e/m_i)^{1/2} < \varepsilon < 1$, an expression for $E_\parallel$ is obtained that is proportional to the magnetic pressure in a cold plasma. Its integral along the magnetic field, $F = -\int E_\parallel ds$, is proportional to $\varepsilon^2 m_i v_A^2$. One-dimensional, fully kinetic, electromagnetic particle simulations verify the theoretical predictions for small-amplitude waves. Further, they demonstrate that eF becomes of the order of $\varepsilon(m_i v_A^2 + \Gamma_e T_e)$ in large-amplitude [$\varepsilon \sim O(1)$] oblique shock waves. These theory and simulations indicate that $E_\parallel$ in magnetosonic waves can be strong in a strong magnetic field.

(9) Yukiko Abe : **The effectiveness of financial incentives in controlling the health care expenditures of seniors**, Japan and the World Economy, Vol.19, pp.461 ～ 482 (2007)

ABSTRACT : This paper examines whether financial incentives imposed on health insurers are effective or not in containing the health care expenditures of seniors. Under the Japanese health care system, the degree of financial incentives to restrain the health care expenditures of seniors varied significantly among almost 5300 insurers. The extent to which the strength of financial incentives is related to the actual health care expenditures is analyzed. The results indicate that financial incentives do not appear to restrain expenditures significantly.

(10) *T.Yamato, T.Ishikura, T.Kakitani, K.Kawaguchi, H.Watanabe : **Spectral Tuning of Photoactive Yellow Protein**, Photochemistry and Photobiology, Vol.83, pp.323 ～ 327 (2007)

ABSTRACT : We report a theoretical study on the optical properties of a small, water-soluble photosensory receptor, photoactive yellow protein (PYP). A hierarchical ab initio molecular orbital calculation accurately evaluated the optical absorption maximum of the wild-type, as well as the lambda_max values of 12 mutants. Electronic excitation of the chromophore directly affects the electronic state of nearby atoms in the protein environment. This effect is explicitly considered in the present study. Furthermore, the spectral tuning mechanism of PYP was investigated at the atomic level.The static disorder of a protein molecule is intimately related to the complex nature of its energy landscape. By using molecular dynamics simulation and quantum mechanical structure optimization, we obtained multiple minimum energy conformations of PYP. The statistical distribution of electronic excitation energies of these minima was compared with the hole-burning experiment [Masciangioli, T. (2000) Photochem. Photobiol. 72,

639-644], a direct observation of the distribution of excitation energies.

(11) *Kyo Yoshida, Toshihico Arimitsu : **Energy Spectra in Quantum Fluid Turbulence**, Journal of Low Temperature Physics, Vol.145, No.1 ～ 4, pp.219 ～ 230 (2006)

ABSTRACT : *The Gross-Pitaevskii (GP) equation describes the dynamics of quantum fluids such as superfluids and Bose-Einstein condensates. Numerical simulations of turbulence obeying the Gross-Pitaevskii equation with forcing and dissipation are performed. The interaction energy spectrum obeys the scaling law* $E^{\mathrm{int}}(k) \propto k^{-3/2}$*, which is consistent with the weak turbulence analysis. However, in contradiction to the assumptions in the weak turbulence analysis, it is found that the density fluctuation is not small and that the frequency spectrum does not have narrow peaks. Another possibility to explain the scaling law is discussed.*

(12) *Kyo Yoshida, Toshihico Arimitsu : **Inertial-subrange structures of isotropic incompressible magnetohydrodynamic turbulence in the Lagrangian renormalized approximation**, PHYSICS OF FLUIDS, Vol.19, pp.045106-1 ～ 14 (2007)

ABSTRACT : The structures of isotropic incompressible magnetohydrodynamic (MHD) turbulence in the inertial subrange are studied within the Lagrangian renormalized approximation (LRA). It is confirmed that LRA derives the total energy spectrum which is consistent with the Iroshnikov-Kraichnan (IK) spectrum. The residual energy spectrum in LRA is found to obey k^{-2} scaling law, where k is the wavenumber. Given are the quantitative estimates of (i) the dimensionless constants in the total and residual energy spectra, (ii) contribution of triad interactions to the energy flux, and (iii) the eddy viscosity and the eddy magnetic diffusivity. A direct numerical simulation (DNS) of a forced quasi-isotropic incompressible MHD turbulence is performed to find that the obtained total energy spectrum is in good agreement with the one derived within LRA both in its scaling exponent and in the dimensionless constant. The residual energy spectrum obtained in the DNS agrees with that derived in LRA with respect to the scaling exponent and the sign of the dimensionless constant, which is negative, although the magnitude of the dimensionless constant is about four times larger.

(13) *Shuji Honjo, Yasuko Sasaki, Satomi Murase, Hitoshi Kaneko, Kenji Nomura : **Transient eating disorder in early childhood A case report**, European Child & Adolescent Psychiatry, Vol.14, No.1, pp.52 ～ 54 (2005)

（14） *Reiko Sagegami-Oba，Yuichi Oba，Hitoo Ohira：**Phylogenetic relationships of click beetles（Coleoptera:Elateridae）inferred from 28S ribosomal DNA:Insights into the evolution of bioluminescence in Elateridae**，MOLECULAR PHYLOGENETICS AND EVOLUTION，Vol.42，pp.410 ～ 421（2007）