物理系ピアレビュージャーナルと
オープンアクセス

植田憲一
電通大レーザー新世代研究センター
SPARC Japan セミナー
2008年４月２２日

自己紹介

専門分野：量子エレクトロニクス、核融合、重力波天文学、
レーザー何でも

＜2000　Topical Editor of Applied Optics, OSA board of Director
応用物理学会、国内学会ジャーナル

2000　IPAP 創立に参加

2002　Laser Physics Letters（RAS）創刊　Associate Editor

2003　Editor-in-Chief of Optical Review

2006　日本物理学会

2007　IUPAP WG on Communication in Physics

2008　新IPAP運営委員

学会ジャーナル、論文誌出版

学問の目的:　純科学　→　知識、認識　抽出、体系化、法則化
応用科学　→　同様＋経験の蓄積、流通

日本から情報発信をする科学ジャーナルの必要性

ジャーナル出版は学問、科学研究活動の“結晶”

☆出版がなければ、知識を定着させる事ができない。

☆Peer Review Journalの必要性

☆学問における文化背景と独自の尺度の必要性。

国際学会と国内学会の関係

学問におけるmonopoly 独占の弊害

中国、エジプト、アラブ、ギリシャ、欧州、米国

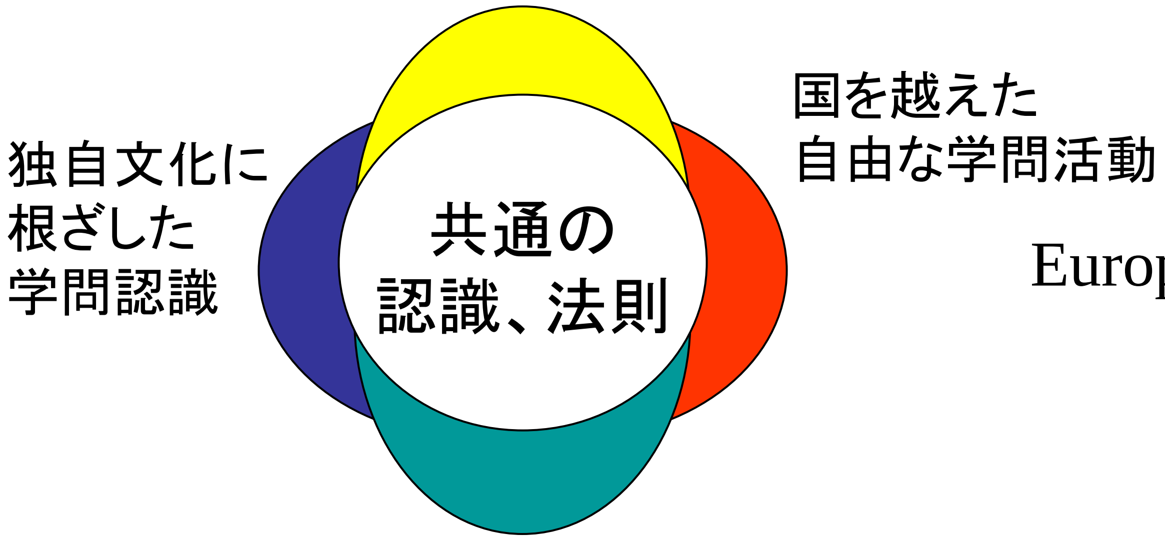
デジタルアーカイブ問題

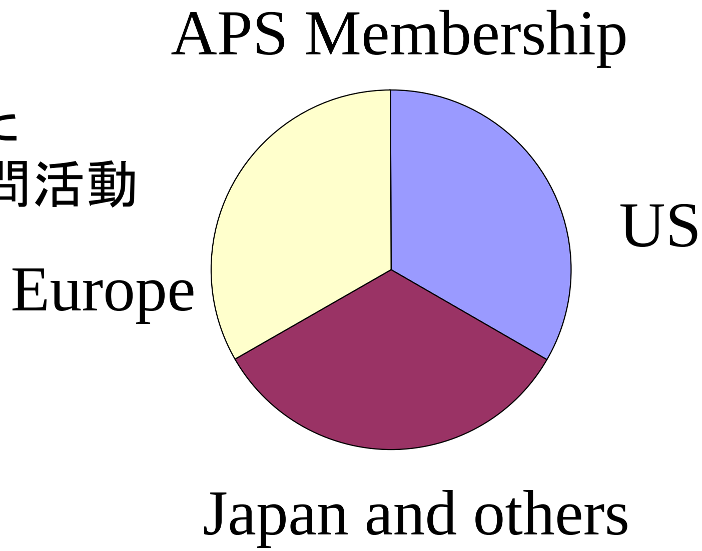
☆アレキサンドリア図書館とGlobal Physics Database

☆arXiv.org (LANL -> Cornell Univ)

科学技術における情報発信とコミュニケーション

科学における情報発信とコミュニケーション
☆英語は科学における国際語
☆真の科学言語は、物理、化学の法則、方法論そのもの
☆理学系論文誌は、世界共通スタンダードの価値基準
純粋な国際競争の世界
☆工学、技術は社会、産業と無関係に存在し得ない。
自国言語の科学技術ジャーナルの必要性がある。

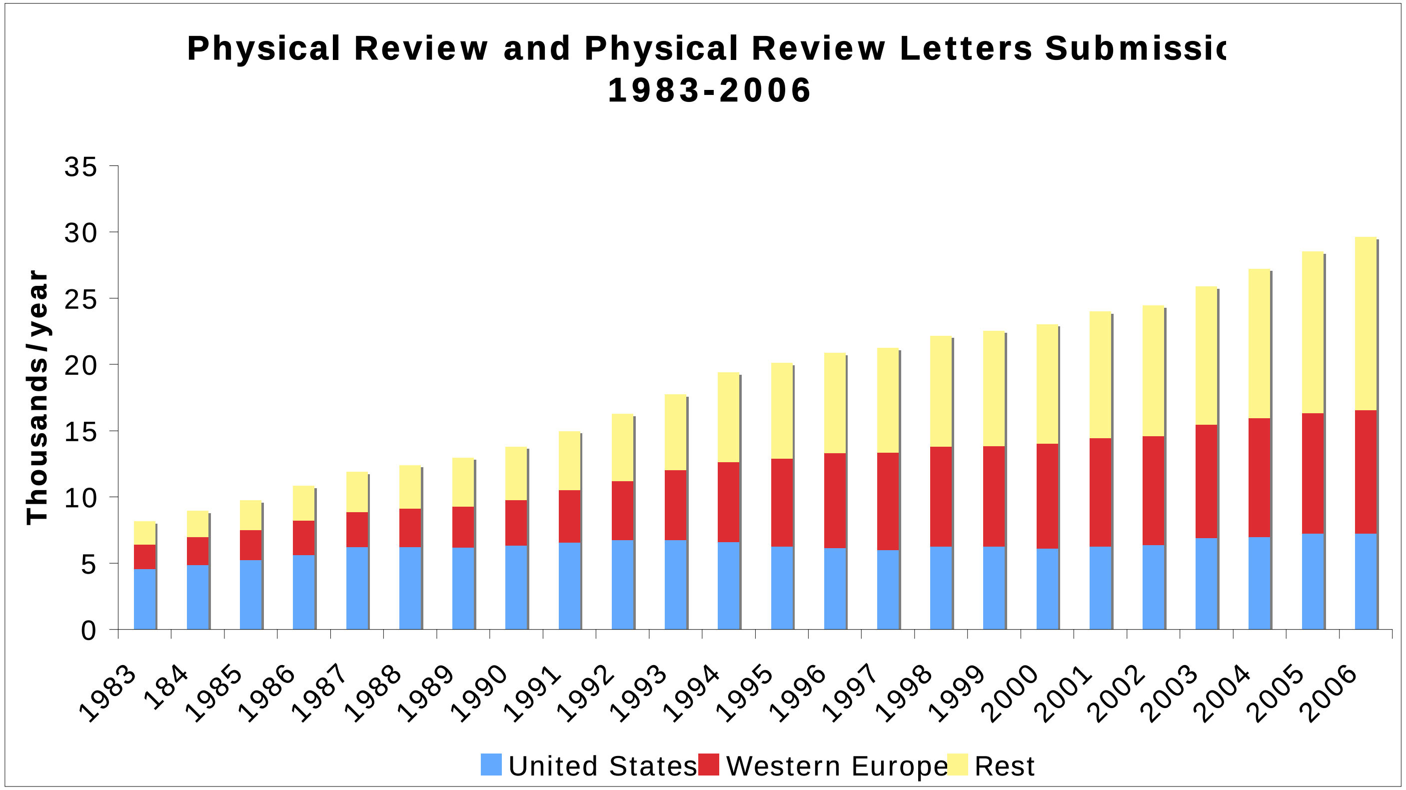




状況の変化：世界の第3極は？

1論文／3分が投稿されている。

APSジャーナルでは、世界は3つの地域に分けられており、
伸長著しいのは、米国、西欧を除く他の3極である。
そして、その中心はアジア・太平洋地区である。



By G. Sprouse

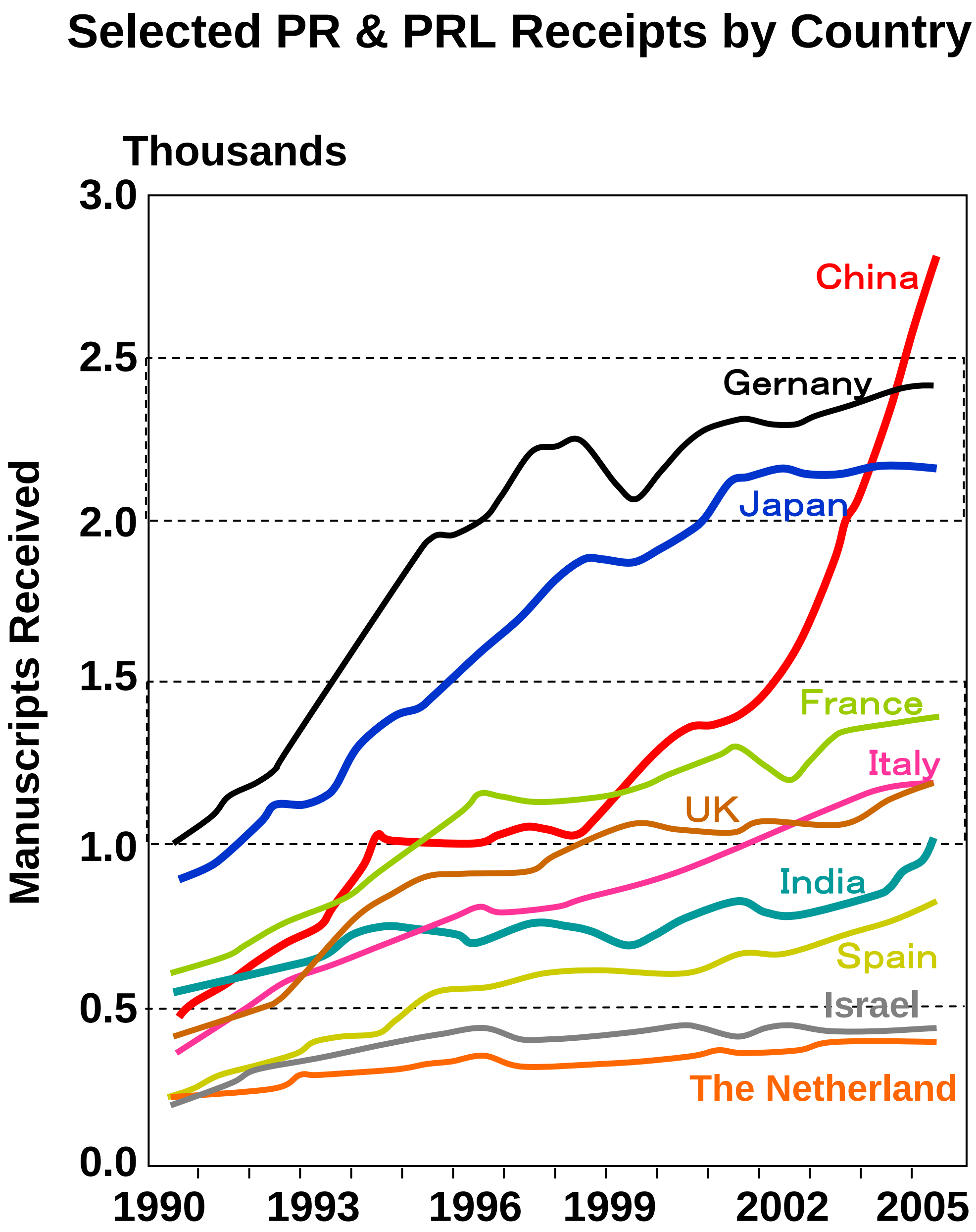
研究活動

中でも、中国、インドが今後の中心となることは確実である。

アジア物理ジャーナルはどうなるのか？という世界からの問いかけ

ジャーナル市場

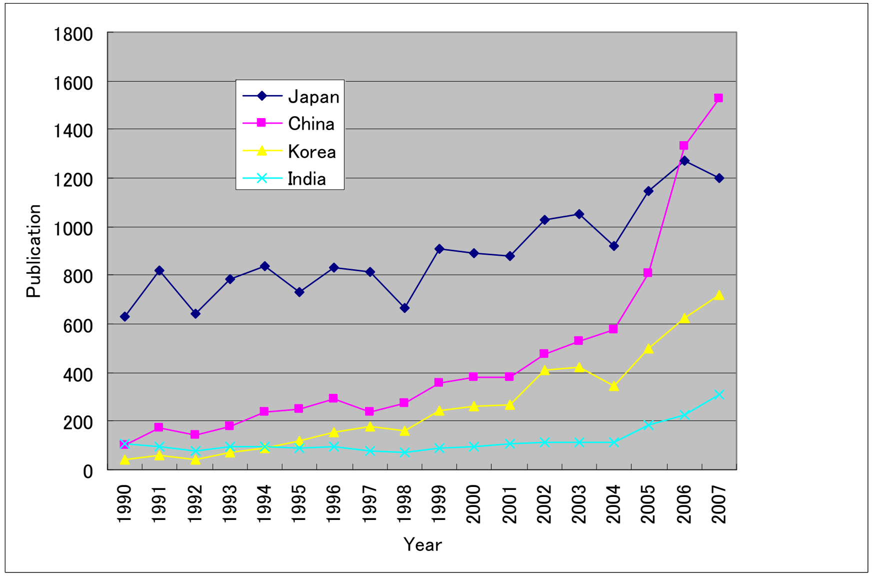
中国の大学図書館契約が大幅に増加
2009年度 APSジャーナル -4%図書館価格を下げる予定



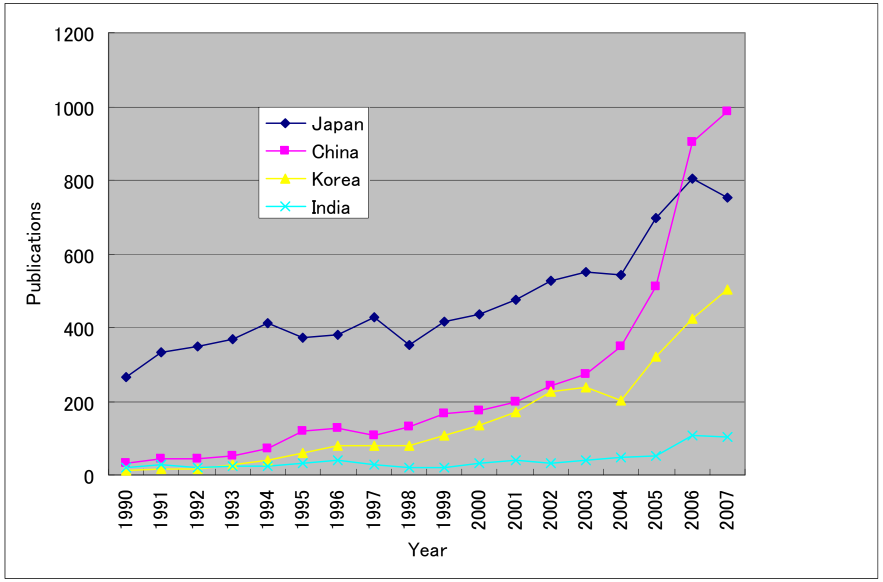
By G. Sprouse

この傾向は応用物理分野ではさらに顕著である。

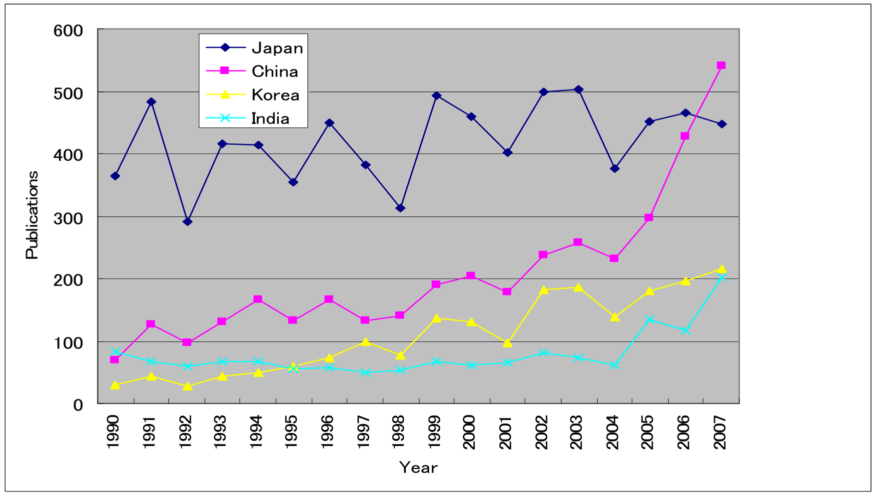
JAP+APL Publications



APL Publications



JAP Publications

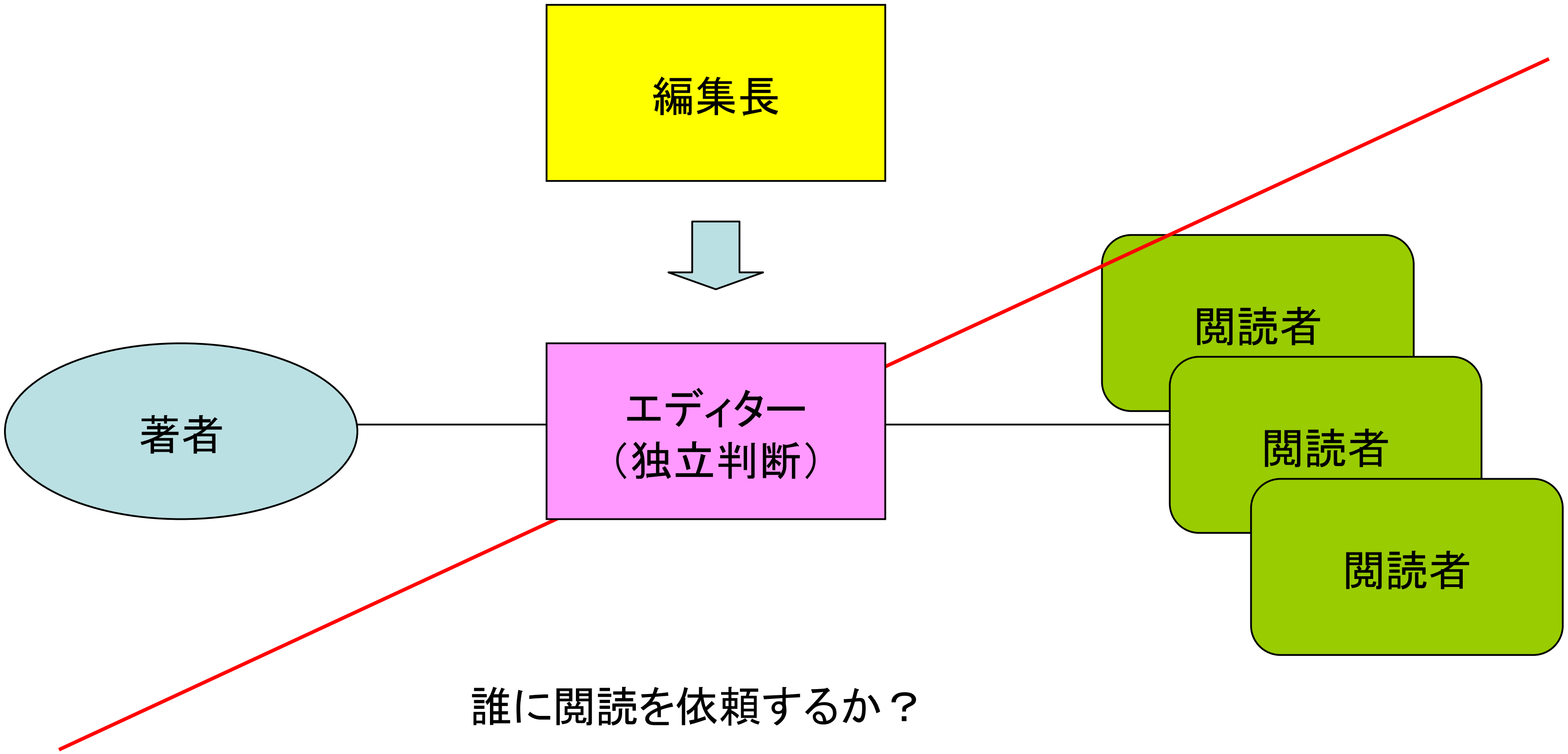


アジア地区の研究は活性化しているが、同時に、論文の欧米流出は当然ながら大きい。日本と同じ問題が議論され始めた。

ピアレビュージャーナル
ボランティアベースの公益的活動

論文投稿、閲読依頼

ポテンャル



誰に閲読を依頼するか？

現役の研究者：競争者、自己利益より科学的真理に規準を！

ピアレビュージャーナル
科学の下の対等・ダイナミックな関係

判定の不服審査：

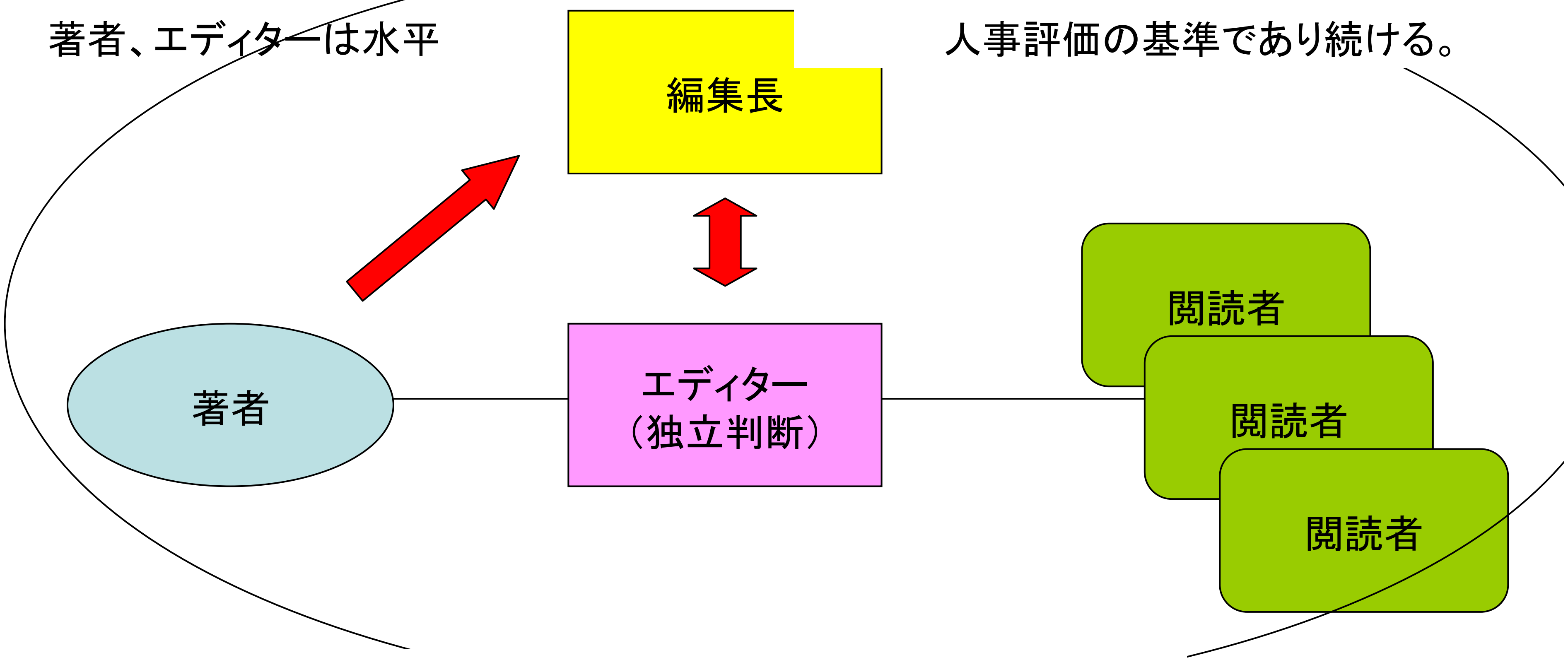
エディター判定の適否判定

著者、エディターは水平

最も公平で正当な科学的判定機構

最もパブリックな評価システム

人事評価の基準であり続ける。



ピアレビューとは学会・研究コミュニティーとしての判断

協同意識が重要

論文掲載の規準は、
コミュニティーの質に依存する。

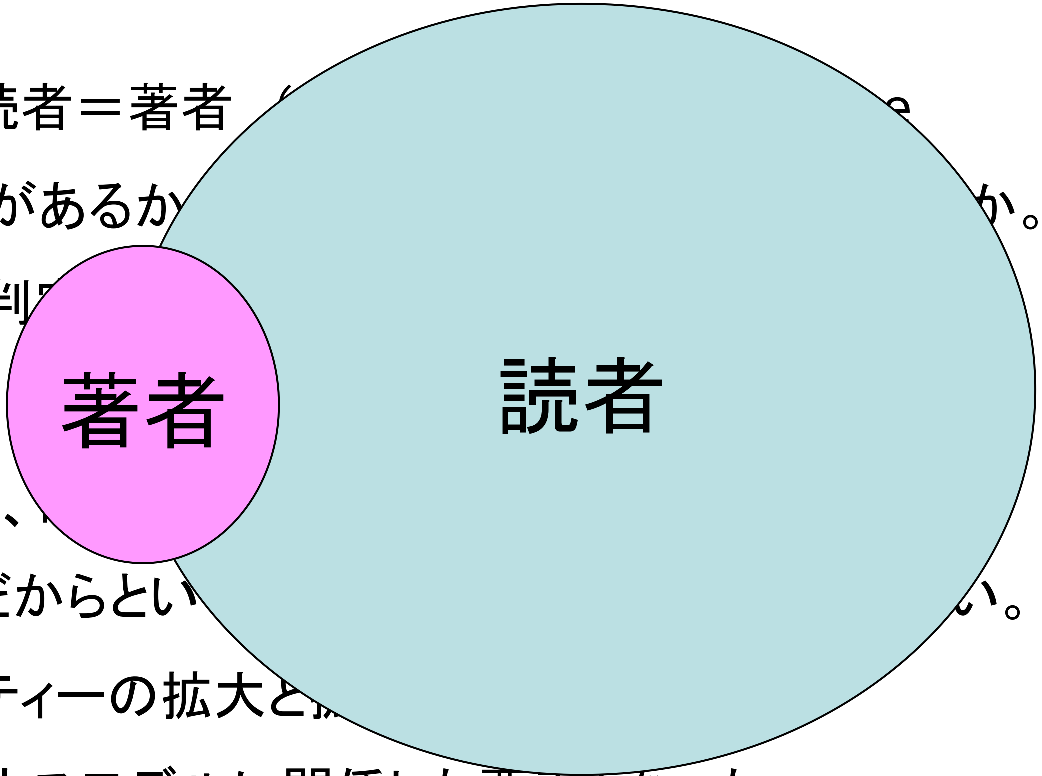
工学、応用物理分野 ： 読者＞＞著者 experience

読者（利用者）は、ジャーナルに掲載された論文に、“正しさの保証”を求める。

純物理分野 ： 読者＝著者

掲載する価値があるか か。）

読者にも内容判



論文掲載の規準は、

無審査論文誌だからとい い。（arXiv.org）

利用者コミュニティーの拡大と

現在では、ビジネスモデルに関係した要素となった。

Peer-Reviewは検閲か?

After 1989 Schwinger took a keen interest in the research of low-energy nuclear fusion reactions (AKA cold fusion). He wrote eight theory papers about it. He resigned from the American Physical Society after their refusal to publish his papers. He felt that cold fusion research was being suppressed and academic freedom violated. He wrote: "The pressure for conformity is enormous. I have experienced it in editors' rejection of submitted papers, based on venomous criticism of anonymous referees. The replacement of impartial reviewing by censorship will be the death of science."

朝永振一郎　J. Schwinger　R. Feynman

1965年ノーベル物理学賞

学問的自由と閲読、出版許可

発想そのものの出版

間違った閲読結果

JOSA広告ページ論文

arXiv.org(LANL->Cornell Univ.)

Astrophysics (**astro-ph** new, recent, find)
Condensed Matter (**cond-mat** new, recent, find)
includes: Disordered Systems and Neural Networks; Materials Science; Mesoscopic Systems and Quantum Hall Effect; Other; Soft Condensed Matter; Statistical Mechanics; Strongly Correlated Electrons; Superconductivity
General Relativity and Quantum Cosmology (**gr-qc** new, recent, find)
High Energy Physics - Experiment (**hep-ex** new, recent, find)
High Energy Physics - Lattice (**hep-lat** new, recent, find)
High Energy Physics - Phenomenology (**hep-ph** new, recent, find)
High Energy Physics - Theory (**hep-th** new, recent, find)
Mathematical Physics (**math-ph** new, recent, find)
Nuclear Experiment (**nucl-ex** new, recent, find)
Nuclear Theory (**nucl-th** new, recent, find)
Physics (**physics** new, recent, find)
includes (see detailed description): Accelerator Physics; Atmospheric and Oceanic Physics; Atomic Physics; Atomic and Molecular Clusters; Biological Physics; Chemical Physics; Classical Physics; Computational Physics; Data Analysis, Statistics and Probability; Fluid Dynamics; General Physics; Geophysics; History of Physics; Instrumentation and Detectors; Medical Physics; Optics; Physics Education; Physics and Society; Plasma Physics; Popular Physics; Space Physics
Quantum Physics (**quant-ph** new, recent, find)

学術研究はオンライン出版のパイオニア

１. インターネット：科学情報ネットワークから出発

２. **WWW:**セルンの国際加速器機構の研究者

Berners-Lee, T.J., Information Management: A Proposal, *Document at CERN,* 1990 (Original document to propose the idea of the World Wide Web. A copy of this document is available at Timothy Berners-Lee's homepage.)

３. ロスアラモス・プレプリントサーバー

Open Policy
Freedom

データベースについては化学系に伝統あり。
１. **Chemical Abstract**

SCIENTIFIC PUBLISHING IN THE EUROPEAN RESEARCH AREA

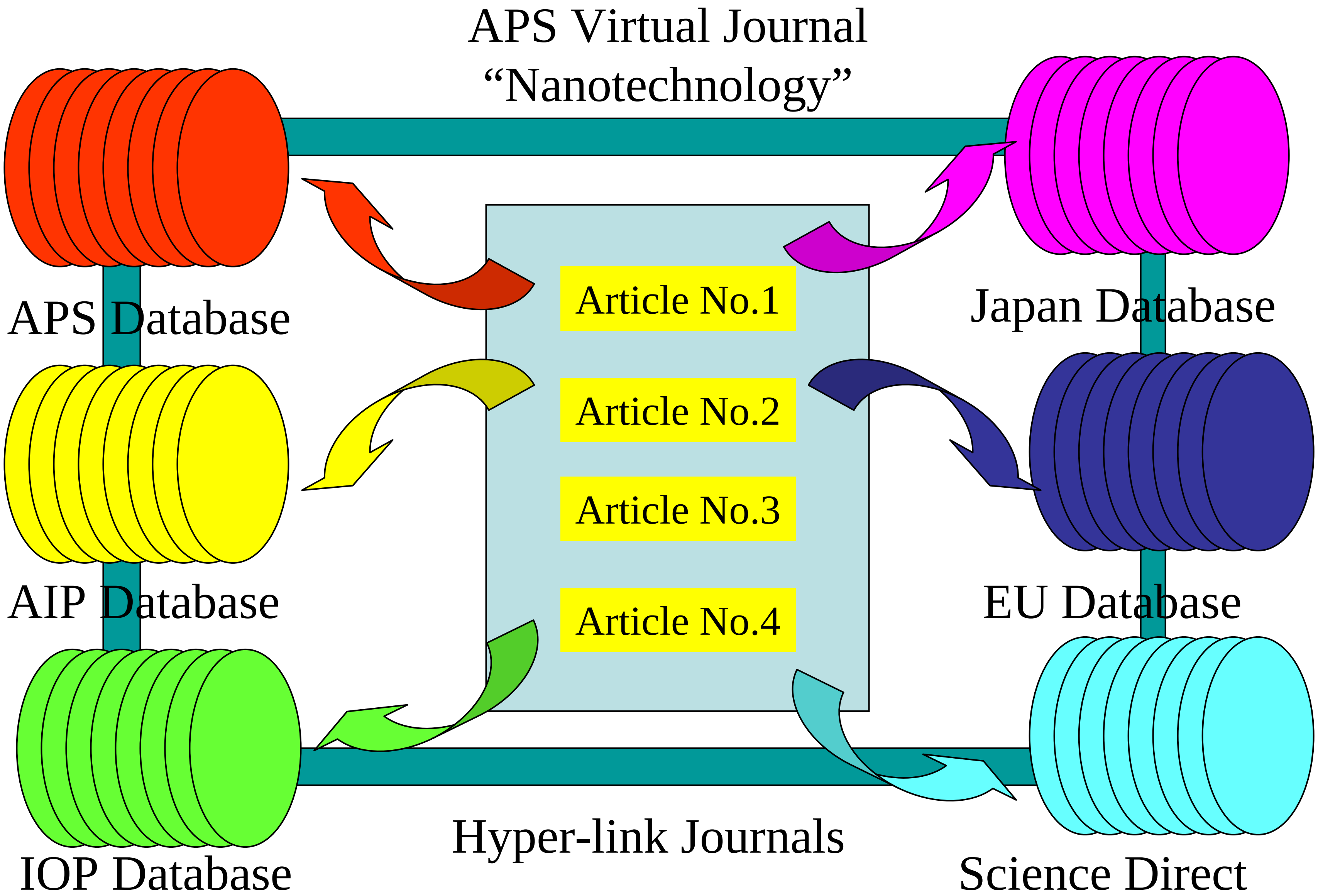
Conference, Brussels, 15-16 February 2007

http://ec.europa.eu/research/science-society/document_library/pdf_06/conference-proceeding-022007_en.pdf

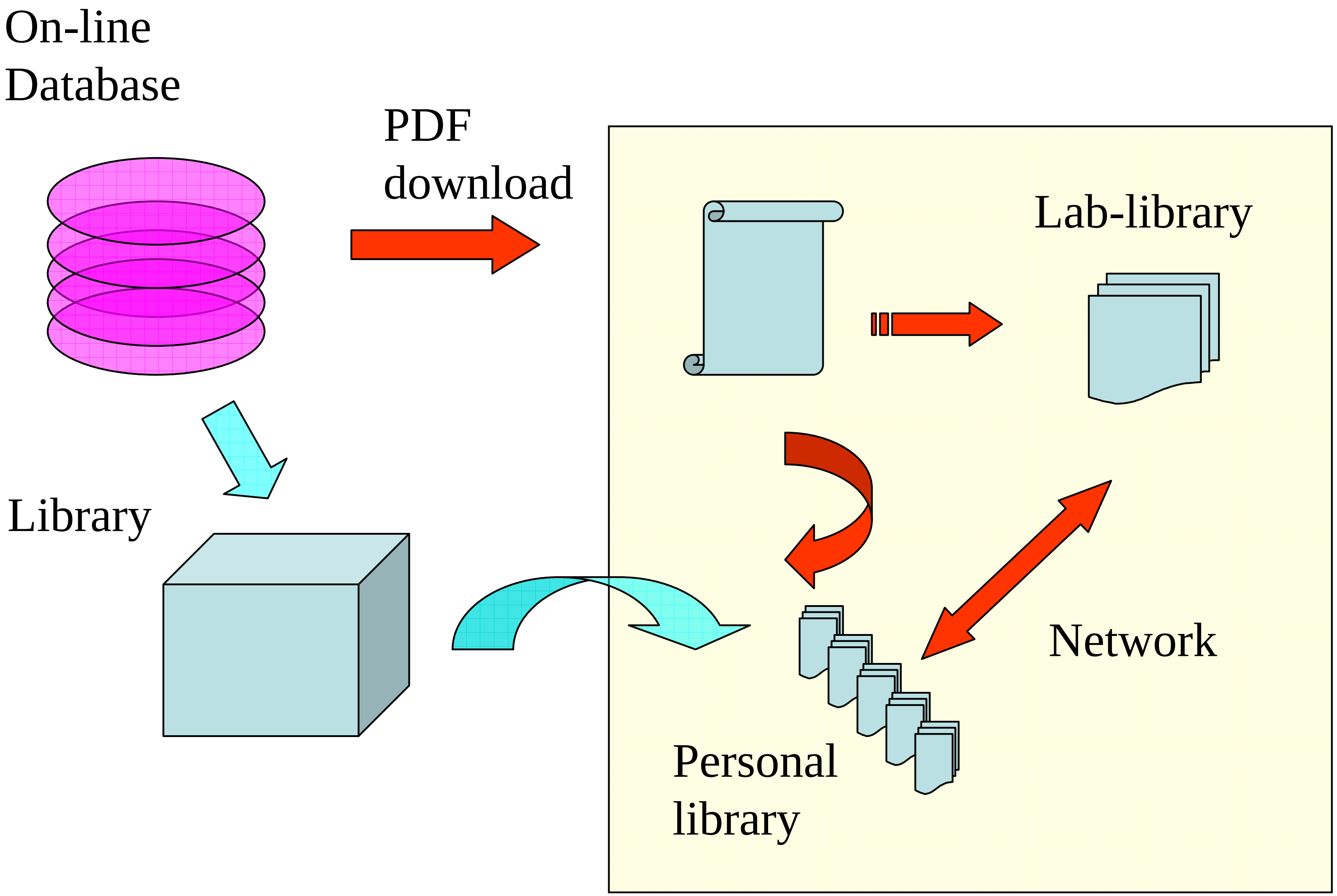
Nobel laureate Sir John Sulston,
“ensuring the outputs of research are freely available to all is the best way to maximize its utility”.

In principle, as Michael Mabe of the International Association of Scientific, Technical and Medical Publishers put it, this means that a single copy of a scientific paper might serve the whole planet. So calls for open access to the literature, free of institutional or financial constraints, can now readily be met, at least in technical terms.

Virtual Journals：Databaseの２次利用



ネットワーク時代の論文利用　研究室ライブラリー



コピー権の発生と変遷　Ｉ

１．印刷機の発明以前 （筆写、拓本）
著作物と著作権が不可分の時代
著者から独立した著作権は不可能
流通が成立していない。

２．グーテンベルグによる大量印刷技術の発明
著作という作業と書籍流通の分離が発生
著作権の出版業者への委譲契約
依然として、専門業者の問題

コピー権の発生と変遷　Ⅱ

３．ゼロックスによるコピー機の発明
一般の読者がコピーを作成可能に
現代的な意味のコピー権の成立
しかし、紙出版からのコピーが前提

著者への回帰

４．オンライン出版とインターネット配信
一般の著者、読者がコピー作成、配信可能に
デジタルコピーでは、オリジナルとコピーの差がない。
一般読者と専門業者の間に、配信に関する技術差はない。
インターネットは本質的にオープンで平等なシステムである。

研究者の矛盾　著者として、学会の構成員として
科学論文の著者は無料で情報配信したい。
論文誌の質をキープすることの重要性は認識している。

紙を持たないオンラインジャーナル

［著者サイドからの利点］

１．製本・印刷が不要 （経費上の利点＋迅速出版の利点（最大1ヶ月）

２．毎日出版が可能 （迅速出版、論文出版日の競争）

３．カラー印刷が無料 （パワーポイント発表との整合性、写真掲載）

４．動画配信が普通

［製作サイドからの利点］

著者によるupload原稿の作成

即日配信

［即日配信サービス］

論文掲載につき、掲載日時証明付きのPDF配信（別刷りサービスに代わり）

SISSA online publishing

Journals by scientists for scientists

科学者が自ら立ち上がったオープンアクセスジャーナル

Nuclear Physicsなどジャーナルの価格高騰に対抗

１０名のスタッフで5誌を刊行、高度に電子化した出版システム

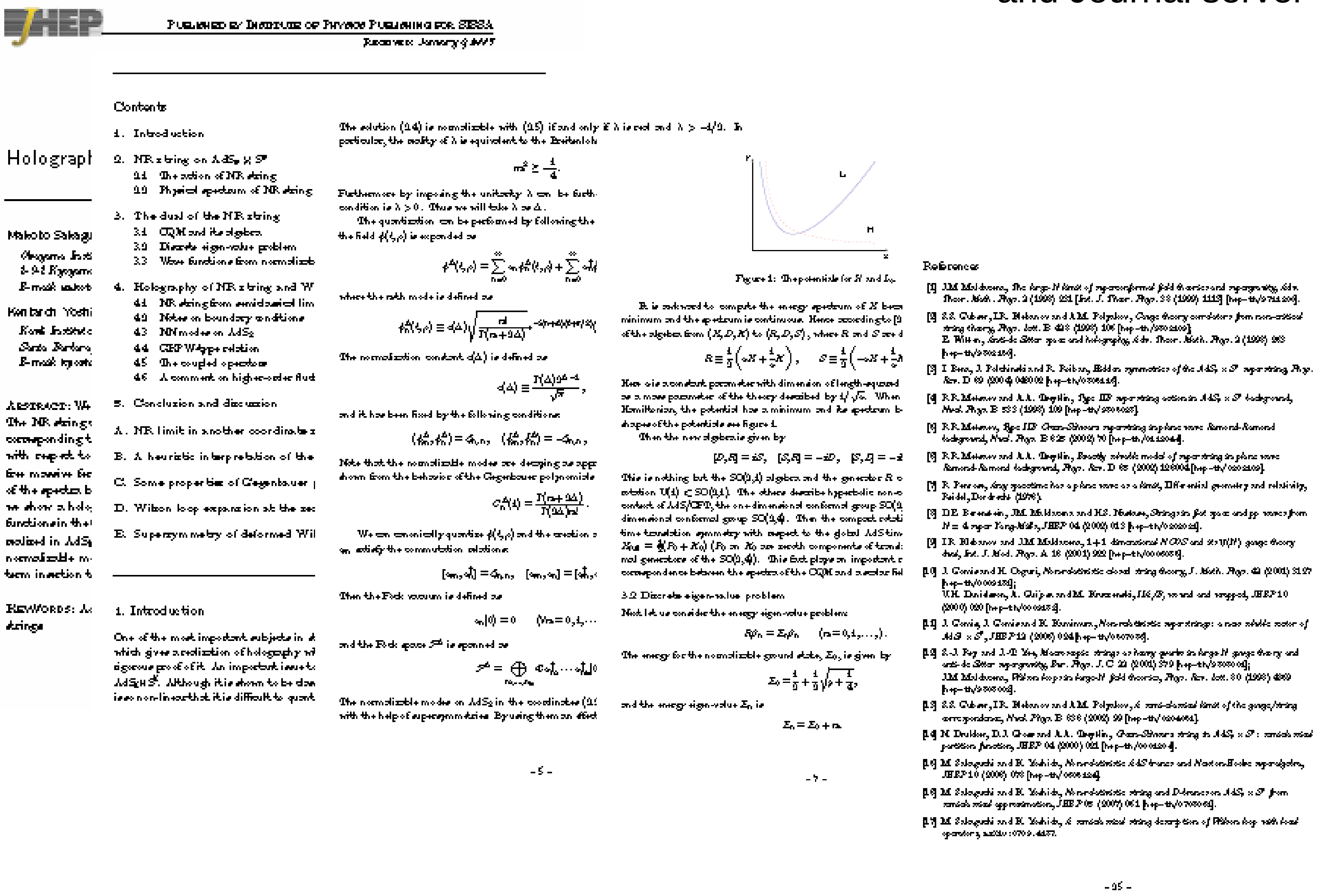
JCAP **J**ournal of **C**osmology and **A**stroparticle **P**hysics
JCOM **J**ournal of Science **Com**munication
Jekyll Online journal produced by the Master in Science Communication
JHEP **J**ournal of **H**igh **E**nergy **P**hysics
JSTAT **J**ournal of **Stat**istical Mechanics: Theory and Experiment.

低価格出版ノウハウなどについて、トレーニングを含めて協力可能

持続可能性？

J-HEP

Linked to ArXiv.org
and Journal server


Published by Institute of Physics Publishing for SISSA

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2. NR string on $AdS_2 \times S^2$

3. The dual of the NR string

4. Holography of NR string and W

5. Conclusion and discussion

1. Introduction

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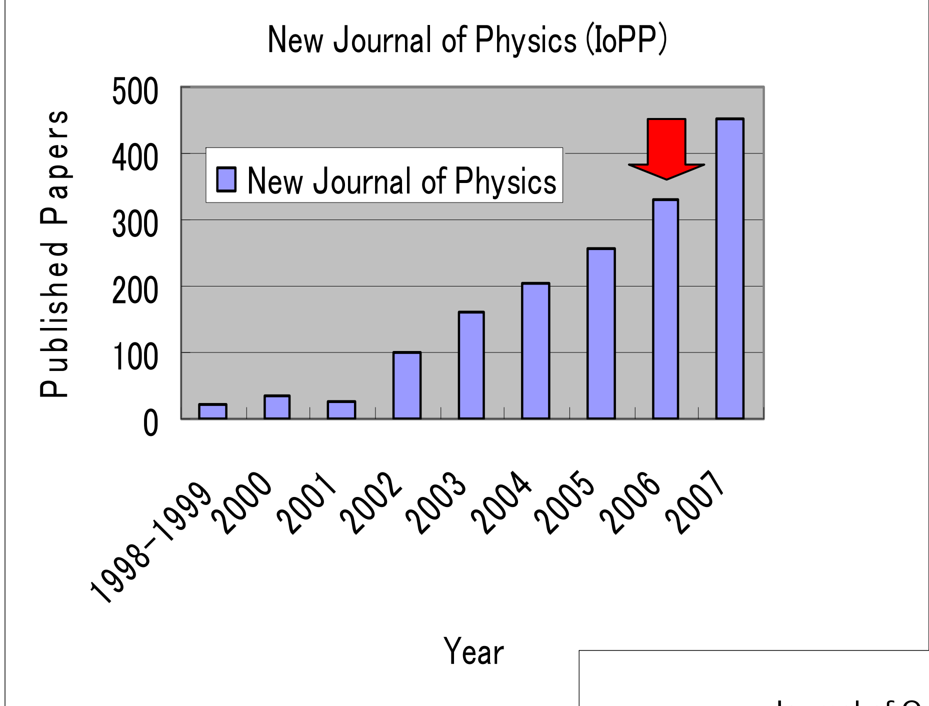
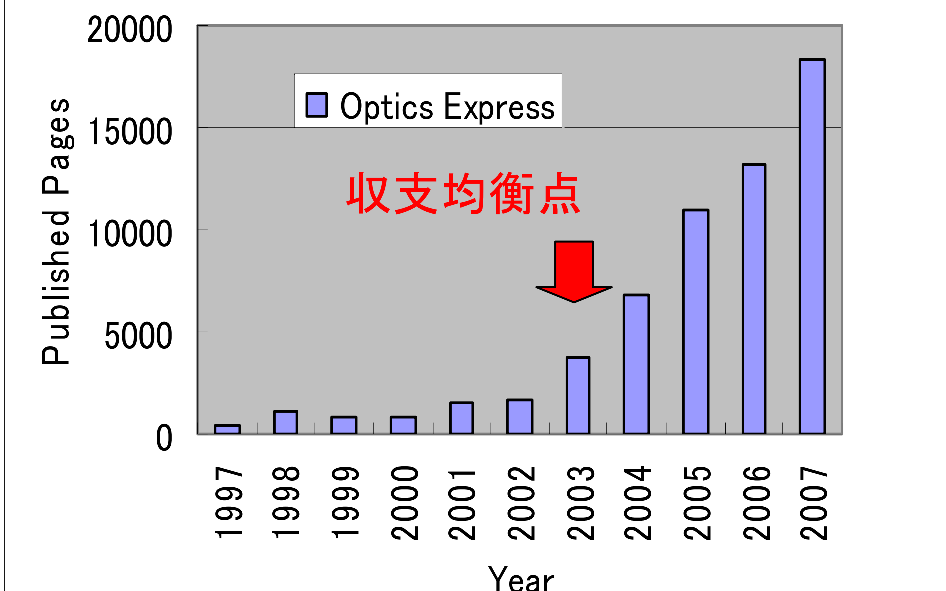
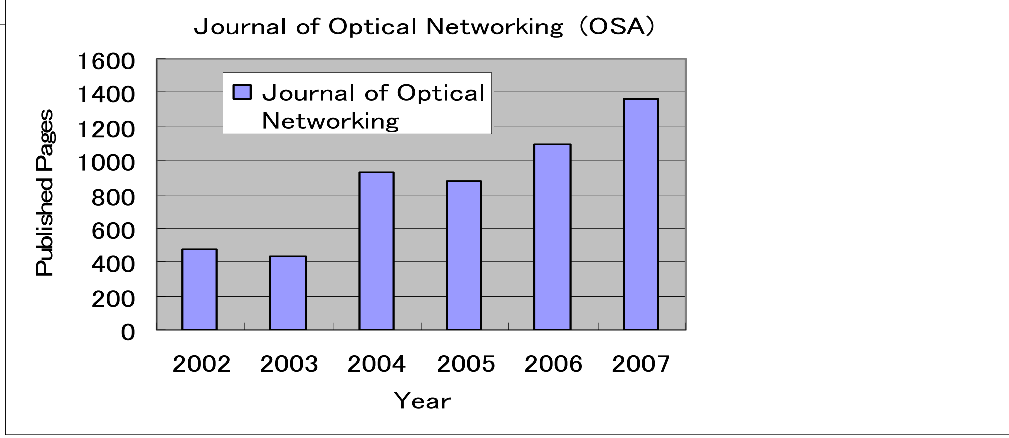
JHEP02(2008)092

著者負担　オンラインのみ
オープンアクセスジャーナルの成功例



年間18369ページに
IF値も光学関係でトップに





オープンアクセスジャーナル
Optics Express 1997- OSA

Composite Yb:YAG/Cr^{4+}:YAG ceramics picosecond microchip lasers

Jun Dong[1*], Ken-ichi Ueda[1], Akira Shirakawa[1], Hideki Yagi[2], Takagimi Yanagitani[2], and Alexander A. Kaminskii[3]

[1]Institute for Laser Science, University of Electro-Communications, 1-5-1 Chofugaoka, Chofu, Tokyo 182-8585, Japan
[2]Konoshima Chemical Co., Ltd., 80 Kouda, Takuma, Mitoyo-gun, Kagawa 769-1103, Japan
[3]Institute of Crystallography, Russian Academy of Sciences, Leninskii Prospekt 59, Moscow 119333, Russia
**Corresponding author: jundong_99@yahoo.com*

Abstract: Efficient laser-diode pumped picosecond self-Q-switched all-ceramic composite Yb:YAG/Cr^{4+}:YAG microchip lasers with 0.72 MW peak power has been developed. Lasers with nearly diffraction-limited beam quality ($M^2 < 1.09$), oscillate at stable single- and multi- longitudinal-modes due to the combined etalon effects in the Yb:YAG and Cr^{4+}:YAG parts of its binary structure.

OCIS codes: (140.3380) Laser materials; (140.3480) Lasers, diode-pumped; (140.3540) Lasers, Q-switched; 140.5680 (Rare earth and transition metal solid-state lasers)

Maximum average output power of 610 mW was measured when the absorbed pump power was 3.28 W, corresponding to the optical-to-optical efficiency of 19%. There is no coating damage occurrence with further increase of the pump power, owing to the decrease of the intracavity energy fluence with high transmission of output coupler used. The transverse output beam profile is shown in inset (a) of Fig. 2 transverse electromagnetic mode (TEM_{00}). Measu focus are shown in inset (b) of Fig. 2. Near diffra M_x^2 of 1.09 and M_y^2 of 1.07, respectively, was ac

near the output mirror was measured to be 100 μm

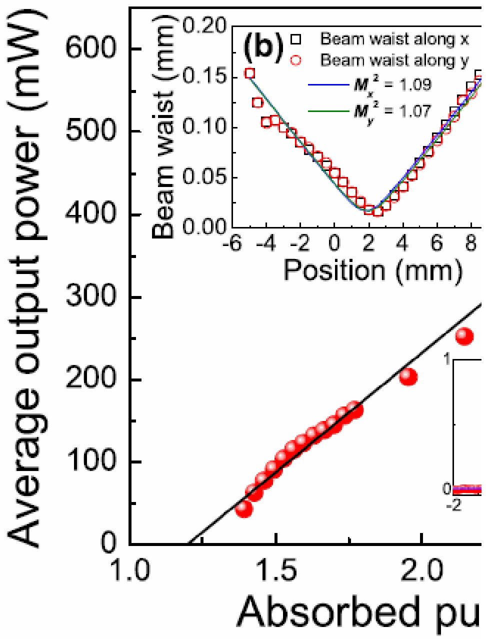


Fig. 2. Average output power as a function of composite Yb:YAG/Cr^{4+}:YAG self-Q-switched mi beam profile and transverse beam profile and (b) sh

There is thermal lens effect in such compa self-Q-switched lasers. The stability of plane-paral lens effect induced by heat generated inside the gain medium resulting from the absorbed

single-longitudinal-mode oscillation could be obtained by increasing the pump beam diameter incident on the laser ceramic at higher pump power.

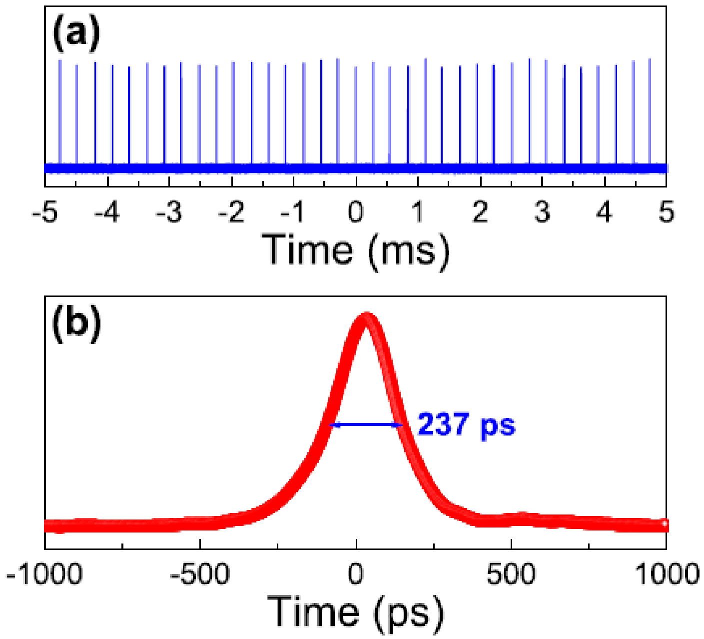


Fig. 4. (a) Oscilloscope trace of self-Q-switched all-ceramic composite Yb:YAG/Cr^{4+}:YAG microchip laser pulse trains; (b) self-Q-switched laser pulse with 237 ps pulse width (FWHM) and 172 μJ pulse energy, corresponding to peak power of over 0.72 MW.

Figure 4 shows the oscilloscope trace of the pulse trains and the output pulse with 237 ps pulse width (FWHM) and 172 μJ pulse energy. The output pulse amplitudes and repetition rate fluctuation are less than 6% [as shown in Fig. 4(a)], evidencing a very stable self-Q-switching laser operation. Over 0.72 MW laser pulses with the pulse width of 237 ps were obtained at a repetition rate of 3.5 kHz when the absorbed pump power is 3.28 W [as shown

New Journal of Physics
IOPP/DPS

New Journal of Physics
The open-access journal for physics

Tunable random packings

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New Journal of Physics 9 (2007) 406
Received 28 June 2007
Published 8 November 2007
Online at http://www.njp.org/
doi:10.1088/1367-2630/9/11/406

Abstract. We present an experimental protocol that allows one to tune the packing fraction η of a random pile of ferromagnetic spheres from a value close to the lower limit of random loose packing $\eta_{\mathrm{RLP}} \simeq 0.56$ to the upper limit of random close packing $\eta_{\mathrm{RCP}} \simeq 0.64$. This broad range of packing fraction values is obtained under normal gravity in air, by adjusting a magnetic cohesion between the grains during the formation of the pile. Attractive and repulsive magnetic interactions are found to affect stongly the internal structure and the stability of sphere packing. After the formation of the pile, the induced cohesion is decreased continuously along a linear decreasing ramp. The controlled collapse of the pile is found to generate various and reproducible values of the random packing fraction η.

Contents

IOP Institute of Physics DEUTSCHE PHYSIKALISCHE GESELLSCHAFT

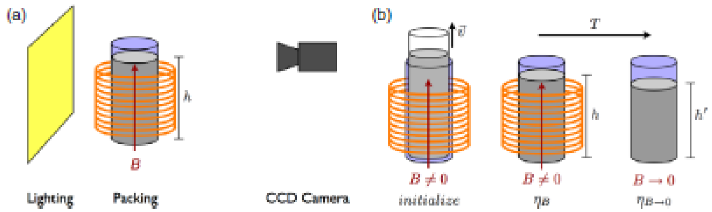

Figure 1. (a) Sketch of our experimental set-up. A high resolution camera (2048×2048 pixels) records the top of the packing placed in a glass tube. The pile is back-illuminated by a homogeneous lighting system. (b) Illustration of the pile creation and measurement protocol. Left: a smaller bottomless tube is inserted into the main glass cylinder. Then, a magnetic B field is applied through the packing. Afterward, this small tube is filled with spherical particles (in gray). The small tube is removed at constant speed v. Center: the position h of the upper grains allows the determination of the packing fraction η_B. Right: the magnetic field starts to decrease linearly to zero (reached after T seconds), the packing collapses partially and the new position h' of the upper grains gives an estimate of $\eta_{B\to 0}$.

grains during the pile preparation in order to control the packing fraction η of the pile. For this purpose, we consider ferromagnetic spherical beads which are submitted to an external magnetic field. After the formation of the pile, the magnetic field is decreased continuously along a linear ramp. This method to control experimentally the packing fraction opens new perspectives in the field of granular media and in the mathematical study of sphere packings.

プラズマ核融合学会　英文誌
Plasma and Fusion Research 2006-
著者負担オープンアクセス

Plasma and Fusion Research: Rapid Communications Volume 2, 008 (2007)

A New Explanation for Toroidal Spin-Up of a Field-Reversed Configuration

Toshiki TAKAHASHI, Hidefumi YAMAURA, Fusaki P. IIZIMA, Yoshiomi KONDOH, Tomohiko ASAI[1)], Tsutomu TAKAHASHI[1)], Yoshiki MATSUZAWA[1)], Taichi OKANO[1)], Yoichi HIRANO[2)], Naoki MIZUGUCHI[3)], Yukihiro TOMITA[3)] and Shigeru INAGAKI[3)]

Department of Electronic Engineering, Gunma University, Kiryu 376-8515, Japan
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(Received 20 November 2006 / Accepted 7 March 2007)

A new explanation regarding the toroidal spin-up of a field-reversed configuration (FRC) is provided. A physical picture showing that the poloidal flux can convert directly to kinetic angular momentum is described. Through the use of an ion orbit calculation in resistively decaying FRC plasma, toroidal rotation at both the separatrix and the field-null is found to occur.

Keywords: field-reversed configuration, toroidal spin-up, resistive flux decay, canonical angular momentum, inductive electric field

DOI: 10.1585/pfr.2.008

An $n = 2$ rotational instability of a field-reversed configuration (FRC) plasma has been observed experimentally and reported in several papers [1–3]. This instability originates from the centrifugal force which acts on a rotating FRC plasma. The origin of toroidal spin-up has not yet direction. Generally, the separatrix radius decreases during the decay phase. If the guiding center r is also decreased, the toroidal velocity v_θ is further increased.

We can also explain FRC plasma rotation from the viewpoint of particle trajectories. In FRC plasma, a small-

投稿料は3，000円(税別)，掲載料は5，000円/頁(税別)です．

Science and Technology of Advanced Materials (NIMS) 2008年1月からオープン化

機関負担により、投稿無料、閲覧無料のオープンアクセス・オンラインジャーナル

IOP Publishing — Science and Technology of Advanced Materials
Sci. Technol. Adv. Mater. **9** (2008) 013001 (14pp) — doi:10.1088/1468-6996/9/3/013001

TOPICAL REVIEW

Software package for structure analysis of quasicrystals*

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Received 31 August 2007
Accepted for publication 2 November 2007
Published 6 March 2008
Online at stacks.iop.org/STAM/9/013001

Abstract
Recently a software package for the structure analysis of quasicrystals has been released, giving a better environment for determining quasicrystal structures. Therefore we can analyze their structures if we know data collection and indexing methods and a theory of structure analysis. For the use of the package, the structure analysis method and several techniques used in the package are shortly reviewed. How to treat key information in the input files of the programs is described in detail.

Keywords: software, quasicrystals, structure analysis

1. Introduction

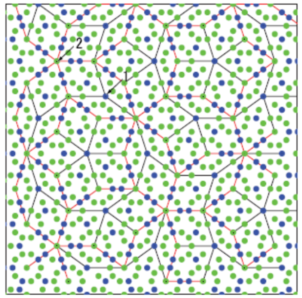
Quasicrystals are special ordered structures which have non-crystallographic point groups including 5, 8, 10 or 12-fold axis, which never appear in conventional crystals. Their diffraction patterns, however, consist of the aggregates of the Bragg reflections as in crystals. In the diffraction patterns, 5, 8, 10 or 12-fold rotation symmetry is found corresponding to the symmetry of quasicrystals. Most quasicrystals found so far are binary or ternary alloys [1]. It has been known already in 1986, that is, 2 years after the discovery of the first quasicrystals, that such a structure is obtained from a periodic structure in a higher-dimensional space by taking a three-dimensional (3D) intersection passing through an arbitrary point [2]. Therefore, the role of the structure analysis is to determine such a higher-dimensional periodic structure. Single (quasi-)crystals with enough size necessitated for the single crystal diffraction method had not been obtained for several years from the discovery but in 1987, the first such crystals were obtained [3] and after that single crystals for many quasicrystals have become obtainable [1]. Their extensive analyses have however been performed after 1997. (For detailed review before 1997, see [4].)

There are two types in quasicrystals. One is called polygonal (dihedral) quasicrystals, which have one 8, 10 or 12-fold axis and is periodic along this axis. They are called octagonal, decagonal and dodecagonal quasicrystals. These structure takes an ordered structure (quasiperiodic structure) in a plane normal to such a periodic axis. Another one called an icosahedral quasicrystal has no period along any directions.

Soon after the discovery, they had been considered to consist of some kinds of atomic clusters. Direct observations of quasicrystals by high-resolution electron microscopy played an important role for this [5]. If we employ this idea, it is easily conceivable that the structure description becomes easy by considering the clusters and atoms linking them. Noting this point, a higher-dimensional cluster model has been introduced [6]. In this model, we describe the clusters distributing in 3D space as a periodic structure in a higher-dimensional space. A software package based on this description has been written by the author and been released recently [7] (http://quasi.nims.go.jp/). In this paper, we describe shortly an analysis based on this program package.

The contents of the paper can be classified into three categories. The sections 1–7 are devoted to a short review of the structure analysis of quasicrystals. The following 9 sections describe on the software package and several calculation techniques employed in the package. Finally,

* Invited paper.



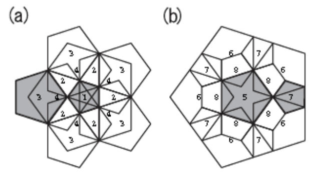


Figure 3. Structure model of the b-Ni phase in d-Al–Ni–Co quasicrystals projected along the 10-fold axis. A black circle represents the transition metal (Ni,Co) and gray, Al. The boat-shaped region located at the outermost part in figure 2 (a part of OD 3) and whole area of figure 2(b) are assumed to be occupied by Al. On the other hand, the transition metal positions are generated by the large pentagonal region except for the boats in figure 2(a).

of the periodic structure. It is known that the vertices of the Penrose pattern are generated from the two small gray pentagons labeled by 1 and 5 in figures 2(a) and (b) [15]. **qcstrc** is the program for calculating atom positions in 3D space for given ODs. The electron density in 3D space can be drawn by the program **qcmem**.

There exist two kinds of vertices around which there are 5 to 7 atoms and 10 atoms (denoted by 1 and 2 in figure 3). The former and latter comes from the ODs 1 and 5, respectively. We call clusters consisting of atoms around these cluster centers clusters 1 and 2. In figure 2, the large ODs consist of the pentagons similar to these but in some cases, they are partially overlapped. For example, the OD 6 is overlapped partially with the ODs 7 and 8. In figure 2, a part except for the central pentagons (ODs 1 and 5) generates peripheral atoms around the cluster center. In addition, a part shared by two ODs generates an atom position which are shared by two clusters. We can prove that an ODs, which generates an atom position far from the cluster center by a fixed distance in the external space, is obtained from the OD of the cluster center by shifting it by that distance along the external space. In the present case, such an OD is located at the peripheral of another large OD. As a result, depending on the kind of clusters, we may have a very complicated polygons with concave parts consisting of the aggregates of small ODs. This is a characteristic feature of quasicrystal structure models consisting of atom clusters. It is worth noting that even if the shape of the ODs is complicated, the principle leading to them is simple.

6. Closeness conditions

It is difficult to conceive that large holes are included in quasicrystals, since they are alloys. Therefore, we need to consider quasicrystals, which do not include such holes. It is also unrealistic that the structure shows an interatomic distance shorter than a value determined by the atomic radii. As a result, we need to consider a dense packing of atoms without including such shorter interatomic distances. Such a model imposes restrictions for the ODs.

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