

第11回月刊JPCOAR「オープンアクセス新任担当者相談会」実務紹介(1)

学術コミュニケーションの 基礎知識

2022年 JPCOAR イベント運営作業部会

本講の内容

- ①学術雑誌とはどのようなものか
- ②論文とはどのようなものか
- ③オープンアクセスとはどういうことか

①学術雑誌とはどのようなものか

科学的発見／知見

それを生み出したのが私だと世界に認知してほしい

その科学的真価を認めてほしい

世に広まってほしい

後世にも伝えたい

“Smaismrmilmepoetalevmibunenugttaviras”



altissimum planetam tergeminum observari.

①学術雑誌とはどのようなものか

“学術雑誌の4機能”

それを生み出したのが私だと世界に認知してほしい

論文の先取権の確立

査読による質の保証

その科学的真価を認めてほしい

世に広まってほしい

知見を世に知らせる

知見を後世に伝える

後世にも伝えたい

ヘンリー・オルデンバーグ氏の書簡（1664～1665）より。同氏は、世界最古の学術雑誌と言われるイギリス王立協会「フィロソフィカル・トランザクション」（1665～）創刊時の事務総長

①学術雑誌とはどのようなものか

一般的な出版物

- 著者・作者は原稿料や印税などを受け取り、収入とする

学術雑誌

むしろ著者がお金（例えば20万円とか）を払うケースもある。

- 著者は対価を得ない

- 研究論文執筆・公開の目的は金銭でなく、著作が広く行き渡り、科学の発展に寄与すること
- 収入は所属機関の給与など。学術的名声を得て、ポストを獲得することが間接的に収入に寄与

①学術雑誌とはどのようなものか

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Research

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electrical energy network

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Power packet transferability
via symbol propagation matrix

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A power packet is a unit of electric power composed of a power pulse and an information tag. In Shannon's information theory, messages are represented by symbol sequences in a digitized manner. Referring to this formulation, we define symbols in power packetization as a minimum unit of power transferred by a tagged pulse. Here, power is digitized and quantized. In this paper, we consider packetized power in networks for a finite duration, giving symbols and their energies to the networks. A network structure is defined using a graph whose nodes represent routers, sources and destinations. First, we introduce the concept of a symbol propagation matrix (SPM) in which symbols are transferred at links during unit times. Packetized power is described as a network flow in a space-temporal structure. Then, we study the problem of selecting an SPM in terms of transferability, that is, the possibility to represent given energies at sources and destinations during the finite duration. To select an SPM, we consider a network flow problem of packetized power. The problem is formulated as an M-convex submodular flow problem which is a solvable generalization of the minimum cost flow problem. Finally, through examples, we verify that this formulation provides reasonable packetized power.

1. Introduction

Electric power has been considered as a continuous flow based on circuit theory, in which power flow is governed by Kirchhoff's Laws and Tellegen's theorem [1]. The circuit theory can be generalized to represent various nonlinear complex systems in the system topology with energy dissipation and energy storage as a network

manner under the conservation of energy [2] that 'all technical all technical communications of random binary digits' [4], rather than by using packet switching, dynamic assignment of network resources, power distribution will be required. We consider electrical energy over packetization [6–15]. Image complicated power flows regulation [16]. In the proposal, we install into the electrical network according to the flow control for the difference between the work, power packet transactions also include, raised in lessons learned from distributed renewable 'Energy packet networks' were servers [20]. There is a proposal that is delivered through discrete variable power router is designed and, in most of these proposals, physical design is not mentioned. With electric power in the same way, power has been high-power used with low-power and high-level layer and the logical layer, aging power. Silicon carbide (SiC) and gallium nitride operation at potentially current Si technology [23,24]. High-frequency switching over high-frequency electricity, and in the developed system, an idea with its voltage waveform. Dual packet level. A schematic diagram of the system consists of network routing to the tag's information, power due to different sources, send the power packets using

the power at each line by using the units to identify the different kinds of packets between routers [10,14,15]. Transfer. In Shannon's information digitized manner [3]. Referring to this minimum unit of power transferred symbol is a minimum unit of power, transferred during a unit time in the t determined as a real number.^{1,2} If messages and energy with symbol of messages is treated as a coding the length of codewords. In power an energy during a finite duration presentation is a problem unique to deal with a set of symbol sequences

ation, which was introduced in [12], on problem of power packetization. networks. Then, packetized power is and quantized manner: a symbol is represented with symbols seen in pn.

If power, we refer to the work about sequences [27,28]. In this work, to cover a sufficiently long time period ties are designed by prioritizing the directed acyclic graphs whose edges with their matching probability in

two concepts to represent packetized temporal correspondence. In power each symbol has its energy and local connectivity is important in w' strain', i.e. the spatial difference stored in each router. Then, we transferability, that is, the possibility to give the finite duration. To select an er, weighing supplied energy from energy at each link during each unit the problem is formulated as an M-tilization of the minimum cost flow

n provides reasonable transmission power with a network flow problem, rgy packet networks with queuing ly different from our problem, it is sing a specific system similar to the discuss our formulation referring to

¹reated as vectors. Thus, power is discussed single symbol. The proposition that symbols do in terms of redundancy of the system.

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a power pulse with an information tag. Here, packetized power is spatially and temporally transferred as symbols in a digitized and quantized manner. At each node, the energy is represented as the total amount of energy of symbols which are sent to and received from neighbouring nodes during a finite duration.

To mathematically represent such transmission of packetized power, we introduced the SPM, in which a symbol is transferred at a link during a unit time. Via SPM, packetized power is described as a network flow in a spatio-temporal sincure. Then, we considered a network flow problem for selecting an SPM in terms of transferability, that is, the possibility to represent given energies at sources and destinations during the finite duration. In networks, packetized power appears as supplied energy from sources and supplied energy to destinations (V1), transferred energy at each link during each unit time (V2), and change of stored energy in each router (V3). Setting a laminar family of subsets of nodes in spatio-temporal structure for the cases of V1 and V3, we can formulate this problem as an M-convex submodular flow problem which is a solvable generalization of the minimum cost flow problem. Unlike conventional minimum cost flow problems, here, we weighed not only values of network flow (V2) but also values of boundary of network flow and their time integrals (V1 and V3). Finally, the formulation was discussed through examples and it is shown that power can be packetized and be controllable while preserving reasonable properties of power.

The established packet-centric framework is completely different from the circuit theory, in which power is handled in a continuous manner and is governed by Kirchhoff Laws and Tellegen's theorem [1]. Here, the concept of a power packet is introduced as a unit of electric power, so that power is digitized and quantized. The results of this paper suggest a mathematical framework which integrates energy and information in electrical energy networks.

Data availability. This work does not have any experimental data. All computational results were obtained with the cycle-cancelling algorithm [29].

Authors' contributions. The concept of SPM was conceived by S.N. and A.M. The network flow problem was formulated and numerically stimulated by S.N. T.H. designed the power packet network and initiated the study. The paper was drafted by S.N. and carefully revised by all the authors. All authors gave final approval for publication.

Competing interests. We declare we have no competing interests.

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(参考) この論文の内容について興味のある方は以下をどうぞ

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Power packet transferability via symbol propagation matrix

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この論文を表す
記号「DOI」

掲載までの経緯

2017.8.21に投稿され、査読を経て、2018.4.17に受理が決定した

照会等の窓口となる著者

この論文の題名

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この論文の著者

自然科学分野では複数名の共著であることが多い

著者の所属

この例では1に所属する著者が2名、2が1名

著者を表す記号
「ORCID」

この例は筆頭著者の縄田信哉先生のもの

②論文とはどのようなものか

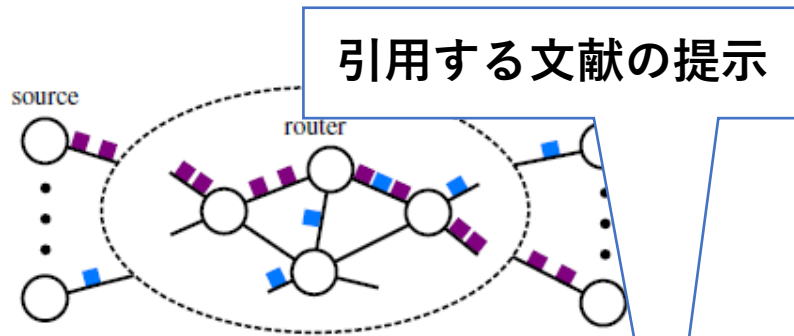


Figure 1. A schematic of power packet dispatching network. (Online version in colour.)

thermodynamics [2]. Here, energy flow is handled in a continuous manner under the conservation of energy. On the other hand, it is shown in Shannon's information theory [3] that 'all technical communications are essentially digital; more precisely, that all technical communications are equivalent to the generation, transmission and reception, of random binary digits' [4]. Communication networks have been developed in a digitized manner by using packet switching, which breaks messages into smaller pieces named 'packets', for dynamic assignment of network resources [5]. If we handle electric power in a digitized manner, power distribution will be changed completely different from the conventional. In this paper, we consider electrical energy networks in a digitized manner.

- 科学の発展 = 先人の業績を踏まえ、新たな知見を積み足す
 - 参考とした先行研究に対しては引用という形で礼を尽くす
 - 多く引用された研究論文は、後続研究に大きな影響を与えたものと評価される

(参考) 掲載した論文が多く引用されると、その雑誌自体の評価が上がる
(それを数値化したものとして「インパクトファクター」がある)

2

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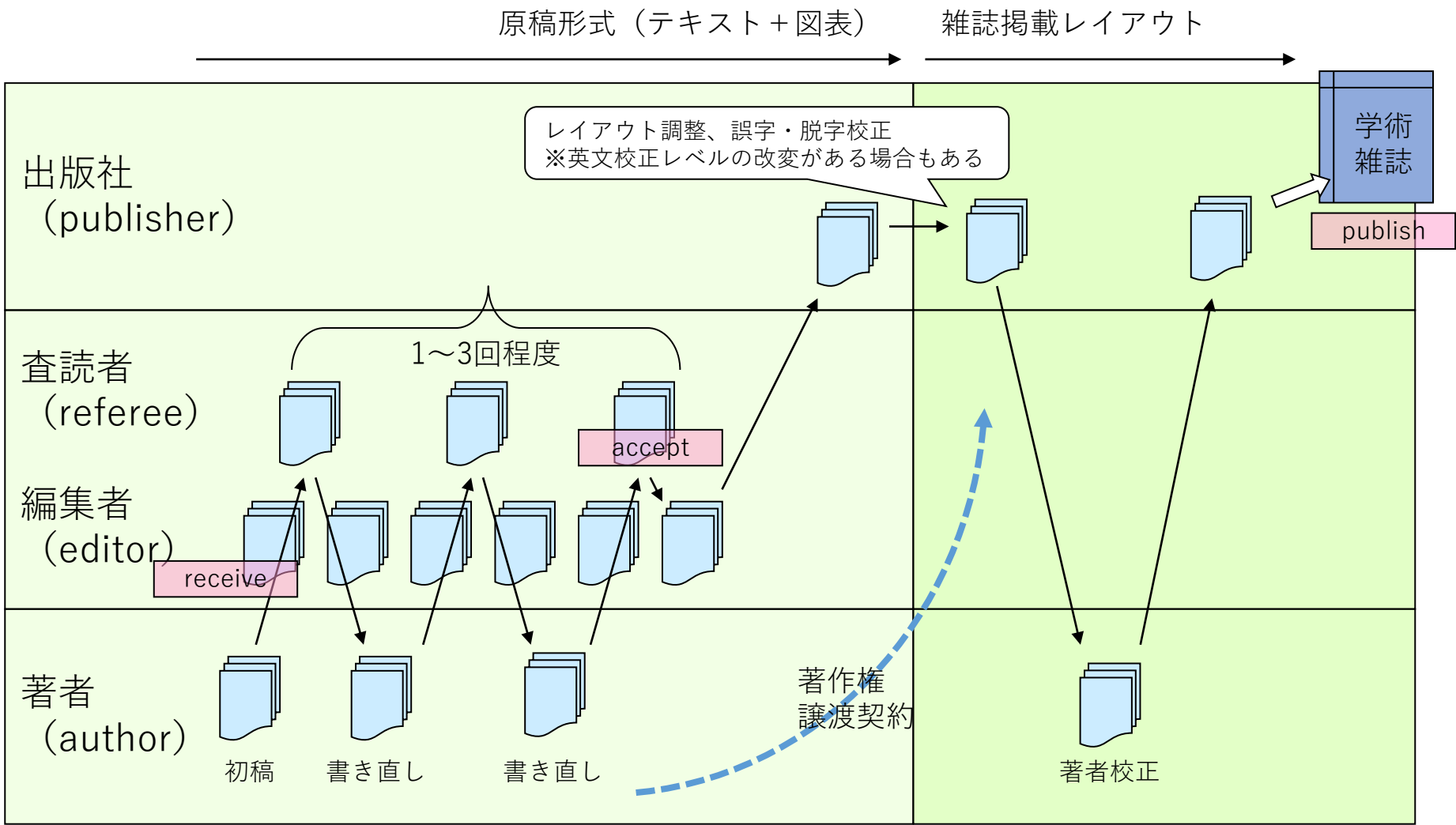
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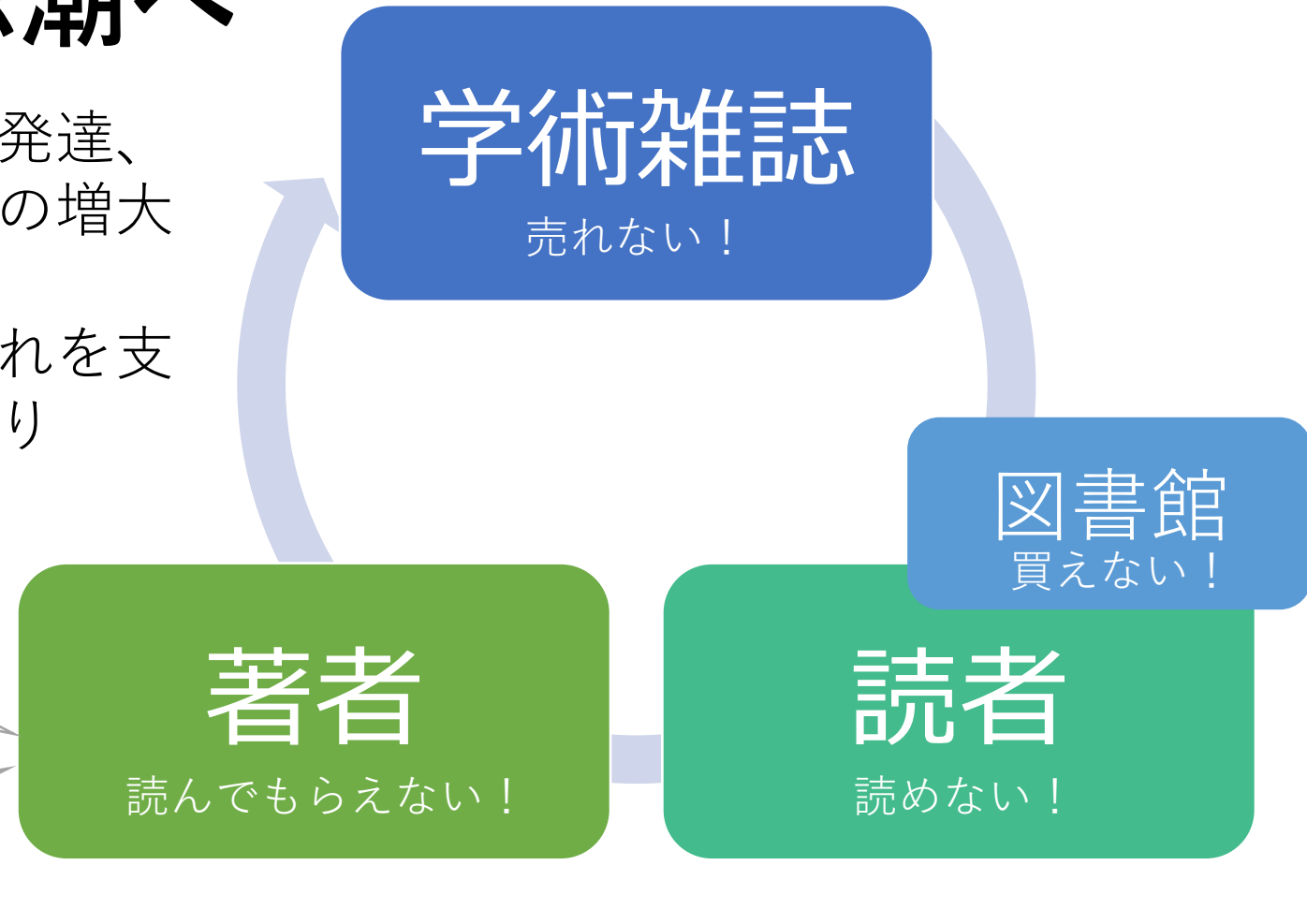
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学術情報の流通不全から オープンアクセス思潮へ

- 世界の拡大、人口の増加、産業の発達、科学の拡大、生まれる科学的知見の増大
- 論文数の増加、学術雑誌の増加
- 情報流通のコストは増えるが、それを支えるべき大学の購買力には限度あり

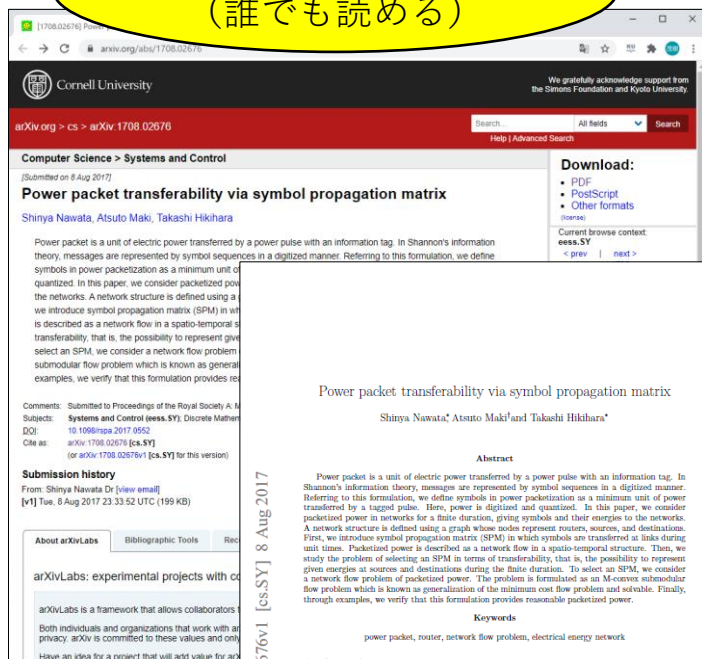
学術雑誌に論文発表したら、それを自分でもウェブで公開することにしよう

無料で公開される学術雑誌に論文発表することにしよう



③オープンアクセスとはどういうことか

プレプリントサーバ
(誰でも読める)



学術雑誌



機関リポジトリ
(誰でも読める)



Nawata S, Maki A, Hikihara T. (2018)
Power packet transferability via symbol propagation matrix.

これで本講は終わります。