

## 第2章 研究活動

### 2-1 平成30年度活動スケジュール

#### 2-1-1 国内会議

- 平成30年電子通信エネルギー技術研究会(EE) …………… 2018年7月
- 平成30年高速信号処理応用技術学会研究会 …………… 2018年8月
- 2018年(第36回)電気設備学会全国大会 …………… 2018年9月
- 平成30年度電気学会 電力・エネルギー部門大会 …………… 2018年9月
- 平成30年度電気・電子・情報関係学会東海支部連合大会 …………… 2018年9月
- 電力技術・電力系統技術合同研究会 …………… 2018年9月
- 放電/開閉保護/高電圧合同研究会 …………… 2018年11月
- 平成30年度JSEE・JWEA合同研究発表会(日本太陽エネルギー学会) 2018年11月
- 平成31年電気学会全国大会 …………… 2019年3月

#### 2-1-2 国際会議

- GRE2018 (Grand Renewable Energy) …………… 2018年6月
- ICEE2018 (International Conference on Electrical Engineering) …………… 2018年6月
- EVS31&EVTeC2018 …………… 2018年9月  
The 31st International Electric Vehicles Symposium & Exhibition (EVS 31) & International Electric Vehicle Technology Conference
- IFAC CPES2018 …………… 2018年9月  
(International federation of automatic control the 10th symposium on control of power and energy systems)
- ICGDTA2018 …………… 2018年9月  
(International Conference on Gas Discharges and Their Applications)
- INTELEC2018(International Telecommunications Energy Conference) 2018年10月
- ICRERA2018 …………… 2018年10月  
(International Conference on Renewable Energy Research and Applications)
- IWHV2018 …………… 2018年11月  
(International Workshop on High Voltage Engineering)
- INCSG 2018 …………… 2018年12月  
(International Conference On Smart Grid)

## 2-2 学会・公表研究論文等

ここには参加した各学会等の名称等を記載し、公表論文タイトル等は後の一覧で示す。

### ○ 平成 30 年電子通信エネルギー技術研究会(EE)

会 期 2018 年 7 月 2 日～3 日  
会 場 北海道大学 フロンティア応用科学研究棟  
主 催 電子情報通信学会

<b>電子通信エネルギー技術研究会(EE)</b> [schedule] [poster]	
専門委員長	長坂 正典 (フロンティア)
副委員長	渡辺 正一 (N/A) フロンティア、津本 正 (福見)
幹事	坂口 新太郎、松田 正三 (福見)
幹事補佐	松田 新太郎(フロンティア)、野方 哲也(新電元工業)、津澤 起(富士通)
<b>無線電力伝送研究会(WPT)</b> [schedule] [poster]	
専門委員長	坂本 志朗 (千代田)
幹事	石塚 浩行(大), 山本 隆之(山工)
幹事補佐	石塚 賢治(A, Jace), 高木 寛(林研大)
<b>半導体電力変換研究会(IEE-SPC)</b> [schedule] [poster]	
委員長	松本 寛人 (千代田大学)
副委員長	藤井 幹介 (富士電機)
幹事	伊藤 淳一 (関西学院大学)、相原 圭二 (首都大学東京)
幹事補佐	西村 和輝 (西京製作所)、高木 寛 (東洋工業大学)

日程	2018年7月2日(月) 15:00～17:00 2018年7月3日(火) 9:00～18:00
会場	野幌電力変送システム第一棟、半導体電力変換第一棟
会場名	北海道大学工学部応用フロンティア応用科学研究棟
住所	〒060-8628 北海道札幌市北区北13条5丁目
火災保険	札幌中央火災保険(株) 札幌支店「北13条ビル」5階 連絡先011-747-1001 <a href="http://www.wakoku-kyoai.co.jp/">http://www.wakoku-kyoai.co.jp/</a>
会費	北海道大学工学部関係者(学生) 無料 他 2,000 円
参加費	● 幹事: Free ● 一般参加者 (講義集込) 5,000 円 ● 学生参加者 (講義集込) 1,000 円
交通	札幌市営地下鉄南北線「北13条駅」徒歩10分 JR 函館本線「北13条駅」徒歩10分
お問い合わせ	011-747-1001(札幌) 050-3538-1234(仙台) 011-747-1001(函館) 011-747-1001(旭川)

無線電力伝送の最適化に関する検討  
配線最適化の比較に関する検討  
Study on the Comparison of the Cable Layout  
Yuji IZUMI, Kazuo NEMEMURA, Kazuo YUKITA, Toshio MATSUMURA, Yasuyuki OHTO, Kazuhiko TANIGUCHI, Hiroshi MORITA, and Naoya KUROKI  
Abstract: This study aims to propose a new optimization method of wiring design. In building or domain, various kinds of equipment are connected to a power supply system. These cables are placed through stacks of the walls and the floor to prevent load-bearing. From various issues, long distance routing is not sufficient, it is necessary to search the cable layout for reducing the length. In this study, a new method is proposed to optimize the routing of cables and prevent load-bearing. Several cable layouts are studied in the model, and the optimization method can be applied to the design of the cable layout. The optimization method is confirmed, supported and evaluated with cable layout in the model. Keywords: Cable layout, Electromagnetic Interference, Electronic Schematic, Field Analysis

1. 研究背景  
2. 研究目的  
3. 研究内容  
4. 研究結果  
5. 結論

### ○ 平成 30 年高速信号処理応用技術学会研究会

会 期 2018 年 8 月 31 日  
会 場 東京都 東京都市大学  
主 催 高速信号処理応用技術学会

<b>2018 年 高速信号処理応用技術学会研究会のご案内</b>	
詳報 ますます新編のこととお喜び申し上げます。	
さて、本年も「高速信号処理応用技術学会研究会」を下記の要項にて開催いたしますのご案内申し上げます。最先端情報の交換、意見交換の場としてご利用頂ければ幸いです。	
プログラムを印刷いたしますのでお席の上、ご多忙中とは存じますがご出席頂けますようお願い申し上げます。	
敬具	
大塚 大輝* 一柳 毅 野田 和人 後援 幹事 秋村 (電気工科大学)	
Experiments of Embedded Program for Electrical Engineering Students *Program training in difficult environments to receive QPS radio waves! Yasuyuki OHTO, Kazuhiko TANIGUCHI, Kazuo YUKITA	
キーワード: 組み込みマイコン、QPS、信号処理、信号伝送、信号処理、信号処理、信号処理 Embedded microcomputer, QPS, signal processing, signal processing, Embedded	
1. 正題 組み込みマイコンは、組み込みシステムにおいて様々な比較的目的を実現できることから自動車、産業機械、産業機械などに幅広く利用されている。このため、組み込みシステム技術は増加している。組み込みシステム技術は、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。組み込みシステムは、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。組み込みシステムは、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。	
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3. 研究内容 組み込みシステムは、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。組み込みシステムは、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。	
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5. 結論 組み込みシステムは、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。組み込みシステムは、組み込みシステムを実現するためのハードウェアとソフトウェアの両方を扱う必要がある。	
* 当日現金 (領収証を発行いたします) 2 席込 (請求書発行いたします)	
懇親会 東京都市大学 世田谷キャンパス 1 号館 4 階 ワンルーム「第一」	
会 費 一般 5,000 円 (当日現金) 学生 2,000 円 (当日現金)	
* ご参加のお申し込みは、8 月 22 日(木)までに、裏面の申込書に必要事項をご記入の上、返信下さいますようお願い申し上げます。	

電気工学学生のための組み込みプログラム実験  
—QPS 電波受信機構築下における処理プログラム実習—  
大塚 大輝\* 一柳 毅 野田 和人  
後援 幹事 秋村 (電気工科大学)

Experiments of Embedded Program for Electrical Engineering Students  
\*Program training in difficult environments to receive QPS radio waves!  
Yasuyuki OHTO, Kazuhiko TANIGUCHI, Kazuo YUKITA

キーワード: 組み込みマイコン、QPS、信号処理、信号伝送、信号処理、信号処理、信号処理、信号処理  
Embedded microcomputer, QPS, signal processing, signal processing, Embedded

図 1 可成り多人数参加の QPS 電波受信機構築

1. 研究目的  
2. 研究内容  
3. 研究結果  
4. 結論

QPS 電波受信機構築下における処理プログラム実習  
QPS (Quadrature Phase Shift Keying) 電波受信機構築下における処理プログラム実習  
QPS (Quadrature Phase Shift Keying) 電波受信機構築下における処理プログラム実習  
QPS (Quadrature Phase Shift Keying) 電波受信機構築下における処理プログラム実習

1. 研究目的  
2. 研究内容  
3. 研究結果  
4. 結論









○ ICEE2018 (International conference on Environment and Energy)

会期 2018年6月25日~28日  
 会場 KOREA UNIVERSITY  
 主催 KIEE

ICEE 2018  
 24th International Conference on Electrical Engineering  
 June 24-28, 2018 Seoul, Korea

01 TECHNICAL PROGRAM  
 02 PAPER SEARCH  
 03 PDF DATA FOLDER

Organized by: KIEE, CSEE, HKIE, IEE, etc.  
 Co-organized by: IEE, etc.  
 Sponsored by: KIEE, etc.  
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Study on Control Characteristics of Power Storage systems in Distributed Power Supply Introduction Power System

Daiji Okawaki, Kazuo Yokota, Toshiro Matsumura\*, and Yasuyuki Goto\*

**Abstract**—This study investigates the response of power storage systems when load and PV fluctuation occur. This is conducted by two control methods. The first method is a conventional method, where the second method is a novel method proposed in this work. From the experimental results, it can be seen that the control method proposed here exhibits better performance compared to the conventional method when it comes to variations in PV power and controlled loads. By using the proposed control method, the power storage system can be kept constant even under load changes.

**Keywords**—Power storage systems, Distributed power systems, Micro-grid

1. Introduction

Recently, the aspect of climate change has become serious at the global level. The first agreement was adopted to address this issue. Consequently, power generating systems using renewable energy have gained attention. It began the largest power plant, photovoltaic (PV) systems to be introduced by 2010 to 2030, and a significant increase in the use of PV systems is expected. However, the output of PV systems is expected to be significantly affected by climate change, such as periodic output fluctuations of the PV systems due to shading by the power system. For this reason, advanced control techniques and new distributed devices for handling to energy is made to maintain the frequency and voltage in the power system is specified value. The use of power storage system has been studied to address this issue [1]. The above three programs and advanced control method of power storage system through a small-scale utility, which includes renewable energy technologies [2]. However, with the continuous expansion of information and communication technologies, there are high quality power is also growing. For this reason, it is necessary to improve the control characteristics of power storage systems to power systems with distributed power introduced.

2. Study on Control Method

In this paper, the communication and control of a power storage system is examined by two methods. Fig. 1 (a) shows a configuration diagram of control method 1. Control method 1 is a conventional control system. In this method, a signal from the power source controls the power storage system in the communication based. Fig. 1 (b) shows a configuration diagram of control method 2. The control method 2 is a control system proposed in this time. This method of directly controls the power storage system with a signal from a power source.

This study compares the control characteristics of the power storage system using these two control methods.



measurement point of the PV power. The PV system is interconnected to the AC system via a PCS. Since the power storage system is introduced via the bidirectional conversion device, it is possible to convert from DC power to AC power, and from AC power to DC power. As shown in Table 1, the capacity of each device in the system is 10.0 kWh for PV power generator, 10.0 kWh for PCS, 10.0 kWh for battery unit battery, 20.0 kWh for bidirectional converter, and 4.0 kW for the AC load. This system can use the bidirectional conversion device to set the maximum power received from the power system. This study has compared the control characteristics by changing the power storage system by setting the maximum power received from the power system.



Fig. 2. System model

Table 1. System configuration

Parameter/Item	Value
Capacity of PV power generator	10.0 kWh
Capacity of PCS	10.0 kWh
Capacity of battery unit battery	10.0 kWh
Capacity of bidirectional converter	20.0 kWh
Capacity of AC load	4.0 kW

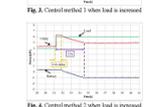
4. Comparison of Control Methods in Load Fluctuation

This section examines the discharge control time of the power storage system when the load fluctuates in discrete using the above two control methods. Specifically, the effects examined the control characteristics of the power storage system when the maximum received power from the small power system is 10.0 kW, and the load power is increased from 4.0 kW to 4.0 kW, and the load power is increased from 4.0 kW to 4.0 kW. Fig. 3 shows the power source when the load is increased using control method 1. Fig. 4 shows the power source when the load is increased using control method 2. The power characteristics of the power storage system are negative during charging, and positive during discharging. As shown in Fig. 5, when control method 1 is used, the load power increased from 4.0 kW to 4.0 kW in approximately 9.0 seconds. However, the power storage system starts discharging in approximately 0.5 seconds, and there is a delay of 3.7 seconds. In addition, it can be seen that 3.7

seconds elapses before the power system converges to 5.0 kHz. As shown in Fig. 4, when control method 2 is used, the load power increased from 4.0 kW to 4.0 kW in approximately 9.0 seconds. By control method 2, the discharge start time of the power storage system is approximately 0.6 seconds, and the response delay time is decreased to 0.2 seconds. In addition, it can be seen that 2.0 seconds elapses for the power system to converge to 5.0 kHz.

Fig. 5 shows the response speed of the control method 2 of these two power storage systems, and the time taken to stabilize. Table 2 shows that by using control method 2, it is possible to shorten the response time, speed up the power storage system, and the time taken for the system power to converge to 5.0 kHz.

Table 2. Comparison of response speed of control method 1 and control method 2



○ EVS31&EVTeC2018

(The 31st International Electric Vehicles Symposium & Exhibition (EVS 31)& International Electric Vehicle Technology Conference)

会期 2018年9月30日~10月3日  
 会場 兵庫県 神戸市・神戸コンベンションセンター (神戸国際会議場・神戸国際展示場)  
 主催 JSAE&APE

EVS 31 & EVTeC 2018  
 The 31st International Electric Vehicles Symposium and Exhibition & International Electric Vehicle Technology Conference 2018  
 Sept.30-Oct.3, 2018  
 KOBE Convention Center JAPAN

A Study on Suppression Method of System Oscillation by Output Variation of Solar Power Generation at VZH

Masayoshi Hamada\*, Kazuo Yokota\*, Toshiro Matsumura\*, Yasuyuki Goto\*

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2017-2018, Yokohama, Japan, 04/04/2018, Japan (E-mail: 47722@riken.ac.jp)

Presented at EVS 31 & EVTeC 2018, Kobe, Japan, October 1 - 3, 2018

**ABSTRACT** In this paper, we investigated suppression of system power fluctuation by EVSS using capacitor for output of PV module. When EV is used as a storage battery, a delay occurs and the power supply device detects and controls the power variation of the distributed power supply. Therefore, smoothing of PV output fluctuation due to introduction of capacitor in the system can be studied and smoothing of battery power accompanying it was studied. As a result, we found that it is possible to suppress fluctuations in battery power by capacitor.

**KEY WORDS** EV, VZL, Capacitor, EVSS, PV

1. INTRODUCTION

In this study, to suppress fluctuation of PV, we investigated the suppression of fluctuation by using a capacitor for output of PV. In recent years, distributed power supplies such as solar power generation (PV) and wind power generation (WPG) are increasing along with the attention focused on the introduction of smart meters. In the study, a problem was recognized that a peak on output side. There are several types of distributed storage batteries, one of which is VZL using EVSS [1]. This is a highly efficient to introduce using storage batteries installed in EV, which can be used as an effect that because only energy batteries are introduced, so that it can be easily introduced. When EV is used as a storage battery, a delay occurs in the time until the power factor data and controls the fluctuation of the power of the distributed power source such as PV. As a result, the EV can not fully follow the power fluctuation, making the system to fluctuate, possibly triggering the stability.

2. ANALYSIS AND PROPOSALS OPERATION OF VZH

We saw that it is possible to find an improvement in the value of EV by varying control on electric discharge loads changing EV. In this paper, we studied the operation method.

using charge and discharge control on time grid. For example, as shown in Fig. 1, power factor of PV can be absorbed by EV energy battery, and control power reception from utility power and the data can be performed. However, due to delay in control, the fluctuation of utility power becomes large or fluctuates when output fluctuation during the day, which may impact the stability of the grid. So, to solve this problem, we propose suppressing PV fluctuation using capacitor in this study.

Fig. 1 Output fluctuation of PV and fluctuation of utility power at constant utility power reception

3. EXPERIMENTAL METHOD

In this study, we conducted experiments in the following two cases.

3.1. When supplying constant power from the EVSS

3.2. When receiving constant power from the EVSS

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