

URSI Commission C in Japan

22th URSI-C-Japan Chairperson Masahiro MORIKURA

1. Domestic Activities

1.1 The 1st scientific workshop presented by the 22th URSI-C in Japan

a). Convener: Prof. Minoru Okada, Nara Institute of Science and Technology

b) Date/time: Nov. 4, 2011 / 13:00 - 17:00

c) Venue: Research Institute of Electrical Communication, Tohoku University RIEC Building #2 (W-Wing) 4F Conference Room

d) Registration fee: Free

e) Listed attendees: 25 persons

f) Local arrangement: Dr. Shoichi Narahashi (NTT DOCOMO)

g) Session title: "Radio science to tackle natural disasters"

h) Presentation: 40 min for presentation, 10 min for Questions and Comments

13:00 - 13:10 Opening Talk

13:10 - 14:00 "Damage of the telecommunication facilities in Tohoku earthquake", Mr. Masaki Fukui (NTT)

14:00 - 14:50 "Experiences in Tohoku earthquake and dependable wireless technology based on joint terrestrial and satellite networks" Prof. Kenji Suematsu (Tohoku Univ.)

15:20 - 16:10 "Construction of relief network in disaster area using ad-hoc network technology" Prof. Kenichi Mase (Niigata Univ.)

16:10 - 17:00 "Introduction of domestic mobile satellite communication system, WIDESTAR II, and role of satellite communication in disasters" Mr. Kazuichi Yamamoto (NTT DOCOMO)

i) Reception and Lamp Session at Iwafuneya, Sendai, Japan

j) Steering committee meeting took place from 8:00 to 9:00 Nov. 5

k) Concluding Remarks

We have four interesting talks about roles of radio science and its problems to face natural disasters. We have to conclude the problems of radio science against disasters when the six months have passed after the Tohoku great earthquake on March 11th, 2011. Many issues have been revealed in disaster relief by use of radio science. In Tohoku earthquake, cellular networks and other radio communication systems, which were believed to be the robust system against disasters, has been damaged. In this workshop, the engineers and researchers working for relief in the stricken area introduced valuable materials on the damage of the telecommunication systems due to earthquake and tsunami disasters. They also shows the construction and operation activities for the networks to face disaster. We have valuable discussion on disaster-resilient network technologies.

1.2 The 2nd scientific workshop presented by the 22th URSI-C in Japan

a) Convener: Dr. Kei Satoh, NTT DOCOMO

b) Date/time: 10:00 - 17:20, 24 February, 2012

c) Venue: Kanazawa Institute of Technology, Nonoichi, Ishikawa, Japan

d) Registration fee: Free

e) Listed attendees: 54 persons

f) Local arrangement: Prof. Kenji Itoh (Kanazawa Institute of Technology)

g) Session title: "Pencil-and-paper exercise on analog circuits"

h) Presentation: 90 min including Q & A for tutorial speaker, 50 min including Q & A for each general speaker

10:00 - 11:30 Tutorial Talk, "Fundamentals of Wireless Local Area Network", Prof. Masahiro Morikura URSI-C-Japan, Chair
 13:30 - 13:40 Opening Talk, Prof. Masahiro Morikura URSI-C-Japan, Chair
 13:40 - 14:30 "Microwave Guided Theory and Its Applications to Design of Matching Circuits", Prof. Futoshi Kuroki (Kure National College of Technology)
 14:30 - 15:20 "Importance of Linear Circuit Theory for Recent Nonlinear High-Efficiency Microwave Power Amplifier Design", Prof. Kazuhiko Honjo (The University of Electro-Communications)
 15:40 - 16:30 "Seven Different Aspects on What Role Q Factor Plays in Resonators and Oscillators" Prof. Takashi Ohira (Toyohashi University of Technology)
 16:30 - 17:20 "Analysis of Diode Circuits" Prof. Kenji Itoh (Kanazawa Institute of Technology)

- i) Reception at Kanazawa, Ishikawa, Japan.
- j) Steering committee meeting took place from 12:00 to 13:00 on 24 February, 2012.
- k) Concluding Remarks

In this workshop, we had one tutorial talk about wireless local area network and four general talks about "pencil-and-paper exercise on analog circuits". These four talks include a microwave guided theory and its applications to design of matching circuits, recent nonlinear high-efficiency microwave power amplifier design, roles of Q factor in resonators and oscillators, and an analysis of diode circuits.

We had a fruitful discussion about the importance of "pencil-and-paper exercise".

1.3 The 3rd scientific workshop presented by the 22th URSI-C in Japan

- a) Convener: Prof. Yasuo Ohno (The University of Tokushima)
- b) Date/time: 13:00 - 17:20, June 1, 2012
- c) Venue: Kagoshima University, Korimoto Campus (Kagoshima, Japan)
- d) Registration fee: Free
- e) Listed attendees: About 50 persons
- f) Local arrangement: Prof. Kenjiro Nishikawa (Kagoshima University)
- g) Session title: "Speed Limit of Electron Devices"
- h) Presentation:

13:00 - 13:10 Opening Talk, Prof. Masahiro Morikura URSI-C-Japan, Chair
 13:10-14:00 Progress and Application of High-speed III-V Semiconductor Devices
 Dr. Hideaki Matsuzaki (NTT Photonics Laboratories)
 14:00-14:50 Present Status and Future Prospects of High-Speed GaN Electron Devices
 Dr. Toshihide Kikkawa(Fujitsu Laboratories)
 15:20-16:10 Device Technologies for Terahertz Applications
 Prof. Tadao Nagatsuma (Osaka University)
 16:10-17:00 LNA Performance for Millimeter-wave Passive Imaging Camera
 Prof. Koji Mizuno (Tohoku University)
 17:00 Closing

- i) Reception: Hotel Welview Kagoshima (Kagoshima, Japan)
- j) Steering committee meeting: June 2(Sat) 8:00~8:50 at Hotel Welview Kagoshima
- k) Remarks

The workshop was held in the volcanic-ashes falling typical in Kagoshima. Dr. Matsuzaki reported the present InGaAs channel devices for 300GHz application and the new technologies for future THz applications. Dr. Kikkawa presented on the millimeter-wave application of GaN devices, which is now being developed for power devices. Prof. Nagatsuma reported the

terahertz signal generation by semiconductor devices using the beat of two laser lights and explained its applications. Prof. Mizuno presented on 35GHz band millimeter-wave camera and the needs of high performance semiconductor devices. As the semiconductor technology matures, uncertainty spreads in its future development and applications. However, all the presentations indicated the possibility of the millimeter and terahertz range applications, which are not yet developed.

1.4 The 4th scientific workshop presented by the 22th URSI-C in Japan

- a) Convener: Prof. Kentaro Nishimori, Niigata University
- b) Date/time: Sept. 21, 2012. 13:00-17:00
- c) Venue: Asari Classe Hotel, Otaru, Hokkaido
- d) Registration fee: Free
- e) Listed attendees: 19 persons
- f) Local arrangement: Dr. Kentaro Nishimori, Niigata University
- g) Session title: "Apply for array signal processing for non communication"
- h) Presentation: 30 min for presentation, 20 min for Questions and Comments
- 13:00-13:10 Opening Talk
- 13:10-14:00 "Apply of multi antennas for radar technology (MIMO radar)," Prof. Hiroyoshi Yamada (Niigata University)
- 14:00-14:50 "PIM (Passive intermodulation) in reflector antennas for array on satellite communications," Dr. Mitsuaki Orikasa (NICT)
- 15:20-16:10 "Reduction of inverter noise using spatial signal processing techniques," Prof. Mitoshi Fujimoto (Fukui University)
- 16:10~17:00 "Intruder detection by spatial sensor using MIMO channels," Prof. Kentaro Nishimori (Niigata University)
- 17:00 Closing
- i) Reception and Lamp Session at Asari Classe Hotel, Otaru.: Attendees 25 persons
- j) Steering committee meeting took place from 8:00 to 9:00 Nov. 5
- k) Concluding Remarks

We have four interesting talks about apply array signal processing for application except communication area. The array signal processing has been attracted much attention, because Multiple Input Multiple Output systems which improves the transmission rate was incorporated in commercial systems. Various applications are introduced using array signal processing in the presentations: application for radar, PIM for phased array, inverter noise canceller. Moreover, fruitful discussion was employed and present and future works are discussed. We have valuable discussion on array signal processing techniques.

1.5 The 5th scientific workshop presented by the 22th URSI-C in Japan

- a) Convener: Shinichi Miyamoto (Osaka University)
- b) Date/time: 12:50 - 17:50, December 21, 2012
- c) Venue: Osaka University, Suita Campus (Suita, Japan)
- d) Registration fee: Free
- e) Listed attendees: 75 persons
- f) Local arrangement: Shinichi Miyamoto (Osaka University)
- g) Session title: "M2M Communications and Environmental Sensing"
- h) Presentation:
 - 12:50 - 13:00 Opening Talk, Prof. Masahiro Morikura URSI-C-Japan, Chair
 - 13:00 - 13:45 "Research and Standardization Activity for Wireless Grid Technology",
Dr. Fumihide Kojima (NiCT, National Institute of Information and Communications Technology)
 - 13:45 - 14:30 "Distributed Electric Power Control Network to Realize Smart Grid",
Prof. Kei Sakaguchi (Osaka University)

14:30 - 15:15 "Activity for Smart Meter Systems in KEPCO", Mr. Hidenao Iwahashi (Kansai Electric Power Co.,Inc.)

15:30 - 16:15 "Research and Development of Sensor Networks to Support Activity in Country Hill",

Prof. Norihisa Segawa (Iwate Prefectural University)

16:15 - 17:00 "Development of the Phase Array Radar for Meteorological Application",

Prof. Tomoo Ushio (Osaka University)

i)Technical Tour

17:00-17:50 "Phased Array Radar Systems for Meteorological Application"

j)Reception: Cafeteria TAKUMI (Osaka University)

k)Steering committee meeting: December 21 (Fri.) 11:30-12:20 at Osaka University

l)Concluding Remarks

In this workshop, we had five technical presentations about M2M communications and environmental sensing. Dr. Kojima reported the research and standardization activity on wireless grid technology based on IEEE 802.15.4g/4e standards. Prof. Sakaguchi presented the practical implementation of demand-response strategy in smart grid with distributed and hierarchical wireless controllers for peak power saving. Mr. Iwahashi reported the activity of KEPCO (Kansai Electric Power Co., Inc.) on smart meter systems from the viewpoint of lifeline service provider. Prof. Segawa presented the sensor network systems based on mad ss technologies for supporting the activity in country hill.

Finally, Prof. Ushio presented the development of active phased array weather radar operated at X band with digital beam forming scheme. After the presentations, we had a technical tour for active phased array radar at Osaka University operated from 2012. Through the presentations and technical tour, we had a fruitful discussion and confirmed the importance of radio science and its applications in the M2M communications and environmental sensing.

2. International Activities

None