

COMMISSION C: Radiocommunication Systems and Signal Processing

(November 2017 – October 2020)

Edited by Makoto Taromaru (Fukuoka University)

1. Summary

The URSI-C subcommittee held scientific workshops 12 times in this triennium. Though we had usually held four times a year, we could not hold workshops in 2020 due to COVID-19 pandemic. Nevertheless, we think that the activity in the first two years was relatively high among the URSI subcommittees in Japan, as is written in the following section “Activity Report.”

The study or research activities of this radio-scientific field has been still high in Japan especially to improve channel capacity of radio links and to develop the next generation radiocommunication systems [1]-[54], what is said “5G” or “Wi-Fi 6.” There is no doubt that the most attractive issue in the field of commission C is 5G and the beyond 5G cellular systems; a lot of papers related to this field were published [35]-[54].

Studies on antennas and propagations including MIMO [1]-[15] are still active because this field is one of the important issues for the high-capacity radio systems, and in-band full duplex transmission systems are still being studied well to improve the frequency resource usage twice.

OAM: orbital angular momentum transmission is one of the new, interesting, and remarkable issues in the fields of array antenna, propagation, MIMO [18]-[26]. In the field of microwave circuit, we can find quite a few literatures on mm-wave including 28GHz for 5G or ultra-high speed radio communications [16],[17], and semiconductor devices for those frequency range as well as for Terahertz wave are actively studied [55]-[64].

Moreover, WPT: wireless power transmission-related studies are very active in Japan where we can find that both of near field and far field transmissions are being researched and developed [27]-[34].

2. Activity Report

The scientific committee of URSI-C in Japan had usually held scientific conferences/workshops four times a year before COVID-19 pandemic began. From 2017

to 2020 during the 24th term, including the last workshop held by 23rd committee¹, we had the scientific conferences eight times as the followings. All the speakers are invited by the committee. These are open workshops for any people and the registration fee is free every time.

The 12th scientific workshop of the 23rd URSI-C in Japan

- Session title: “Recent trend of Antenna, Propagation, System, and Signal Processing Technologies toward to future”
- Date/time: 09:00 - 11:35, 22nd March 2018
- Venue: Tokyo Denki University (Adachi ward, Tokyo pref.)
- Listed attendees: 28 persons
- Presentation:
“The status on standardization for channel models used in the 5G,” by Koshiro Kitao (NTT Docomo), and 4 totally five invited talks.

The 1st scientific workshop of the 24th URSI-C in Japan

- Session title: “Wireless Access Technologies Towards the 5th Generation Mobile Communication”
- Date/time: 14:00 - 17:00, June 29th, 2018
- Venue: 16th Building, Yagami Campus (Yokohama city, Kanagawa pref.)
- Listed attendees: 28 persons
- Presentations:
"Docomo's 5G Trial for 5G Realization" by Dr. Satoshi Suyama (NTT Docomo) and 3 totally four presentations.

The 2nd scientific workshop of the 24th URSI-C in Japan

- Session title: "OAM radio transmission technologies"
- Date/time: 14:00 - 17:00, October 12th, 2018
- Venue: Setsunan University, Neyagawa-shi, Osaka Pref.
- Listed attendees: 22 persons
- Presentations:
"Analog OAM Multiplexing and Related Technologies" by Prof. Atsushi Sanada (Osaka University), and two totally three presentations.

¹ Each scientific committee of URSI in Japan is usually renewed on 1st April so this workshop was steered by the previous 23rd committee.

The 3rd scientific workshop of the 24th URSI-C in Japan

- Session title: "Millimeter / Terahertz Wave Devices and Circuits their Applications for Ultra-High Speed Wireless Communication Systems"
- Date/time: 13:30 - 17:20, December 14th, 2018
- Venue: Room "Hourai", Hotel Ryokusui-Tei in Akiu-Onsen (Sendai, Miyagi pref.)
- Listed attendees: 18 persons
- Presentations:

"Advances in terahertz wireless communication technology utilizing resonant-tunneling diodes" by Prof. Safumi Suzuki (Tokyo Institute of Technology), and three totally four presentations.

The 4th scientific workshop of the 24th URSI-C in Japan

- Session title: "Wireless Access Technologies Beyond the 5th Generation Mobile Communications"
 - Date/time: 13:20 - 17:30, March 1st, 2019
 - Venue: Room "the meeting room in the KKR Kinosaki-Genbu", Kinosaki-cho, Toyooka, Hyogo
 - Listed attendees: 19 persons
 - Presentations:
- "IoT standardization activity in 3GPP" by Mr. Satoshi Nagata (NTT DOCOMO, Inc.), and four totally five invited talks.

The 5th scientific workshop of the 24th URSI-C in Japan

- Session title: "Current status and issues of antenna propagation technology in V2X communications"
- Date/time: 13:45—17:25, May 31st, 2019
- Venue: Room "The meeting room 1 in the Tenbusu Naha" (Naha, Okinawa, Japan)
- Listed attendees: 20 persons
- Presentations:

"Antenna configuration methods on V2V communications for Platooning" by Mr.Kazuma Tomimoto (Softbank Corp.), and three totally four presentations.

The 6th scientific workshop of the 24th URSI-C in Japan

- Session title: "Progress of Millimeter Wave Devices for Wireless Communications"
- Date/time: 14:00—17:50, September 27th, 2019

- Venue: Presentation Room, Shin-Kawasaki Technology Square, Fujitsu Limited (Saiwai-ku, Kawasaki, Kanagawa, Japan)

- Listed attendees: 39 persons

- Presentations:

"Recent trends in GaN HEMTs for improved performance" by Prof. Masaaki Kuzuhara (Fukui University), and three totally four presentations.

The 7th scientific workshop of the 24th URSI-C in Japan

- Session title: "Semiconductor device technologies supporting high-speed big-capacity radio communications beyond 5G"

- Date/time: 13:30—17:25, December 6th, 2019

- Venue: Room No. 23, EE-Bldg. 1F, Faculty of Eng., Koorimoto Campus, Kagoshima University, Kagoshima.

- Listed attendees: 20 persons

- Presentations:

"Advances and future trends in 5G mobile communications systems" by Prof. Fumiya Adachi (Tohoku University), and three totally four presentations.

Note that all the workshops planned after Jan. 2020 were cancelled due to COVID-19 disaster.

The activities in details are available more precisely at our web site, <https://www.ursi-net.org/jp/Commission-C/24th/index-en.shtml> .

3. References

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