

○Profile

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Affiliation : Electrical Power and Electronics Program,
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Education : Graduated from Department of Computer Science and Communication
Engineering, Faculty of Engineering, Kyushu University in
Mar. 1985, and completed Master course and Doctor course of
the graduate school of the same department in Mar. 1987 and
in Mar. 1990, respectively.

Occupation : Apr. 1990 - Sep. 1994 Research Associate, Kyushu University
Oct. 1994 - Mar. 1996 Assistant Professor, Oita University
Apr. 1996 - Mar. 2016 Associate Professor, Oita University
Apr. 2016 - present Professor, Oita University

Degrees : Master of Engineering (Mar. 1987, Kyushu University)
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Research Field : Electromagnetic Wave Theory and Applications

Society : IEICE Japan, Japanese Society for Medical and Biological
Engineering

○Research

Research Subjects:

① Research on Computer Simulations of EM Wave Propagation, Scattering, and Shielding

Rapid popularization of mobile communication equipments, such as 5G cell-phones, tell us the beginning of Ubiquitous Era. However, there is a suspicion that the EM environment becomes worse in various life space, especially in hospitals. The objective of this research is to make a guideline to introduce wireless communication systems in hospitals with safety through computer simulations based on FDTD method, such as

- (1) Characteristic analysis of EM-shielding on metal or non-metal periodic structures,
- (2) Characteristic analysis of antennas used in RFID sensing systems.

② Research on EM Wave Simulator

We can not catch electromagnetic waves by our eyes except visible rays. It is very important for grasping the real meaning of electromagnetic waves to visualize various phenomena such as EM scattering by objects, waveguide propagation, and so on. In this study, we are developing an EM wave simulator based on CIP (Constrained Interpolation Profile) method, FDTD (Finite-Difference Time-Domain) method, and Java programming.

③ Research on Electromagnetic Inverse Scattering Problem

Estimation of positions, shapes, and medium constants of unknown objects using EM wave scattering has become of great interest in relation with practical applications such as geophysical sensing, medical imaging, nondestructive testing, and so on. Because the scattering characteristics are closely concerned with the frequency of the incident wave, it seems that estimation methods using multiple-frequency waves are effective to extract wide-range information of the objects in comparison with methods using a monochromatic wave. In this study, the development of high-speed and high-precise estimation method is aimed through computer simulations considering microwave CT (Computed Tomography).

Keywords:

- ① Electromagnetic Interference, Electromagnetic Compatibility, Propagation, Scattering, Shielding, Computer Simulations
- ② Visualization, Electromagnetic Wave Simulator, CIP method, FDTD method
- ③ Inverse Scattering, Non-Destructive Inspection

Results:

Journals, International Symposium Papers (within 5 years)

- Eisuke Hanada and Takato Kudou
“How inappropriate cabling prevents hospitals from becoming "smart" and future communication system management concerns,"
Journal of Biotechnology and Biomedicine, Vol. 7, Issue 1, pp.149-152,
Feb. 2024.

- Eisuke Hanada and Takato Kudou
 “Architectural problems related to wireless communication in hospitals and measures to ensure stable operation,”
 Proceedings of 2023 International Conference on Emerging Technologies for Communications (ICETC 2023/Sapporo, Japan), P1-1, pp.1-4, Nov. 2023.
- Eisuke Hanada and Takato Kudou
 “A new way of approaching electromagnetic disturbance with/from medical devices: wireless communication failures,”
 Proceedings of URSI GASS 2023, Sapporo, Japan, pp.1-3, Aug. 2023.
- Eisuke Hanada and Takato Kudou
 “Future considerations for the management of hospital LANs,”
 Proceedings of 2022 International Conference on Emerging Technologies for Communications (ICETC2022/Tokyo, Japan), S10-1, pp.1-3, Dec. 2022.
- Seita Kono and Takato Kudou
 “3D-FDTD analysis of electromagnetic shielding by using single-square-loop frequency selective surface,”
 Proceedings of 8th Asia-Pacific Conference on Antennas and Propagation (APCAP 2019/Incheon, Korea), 6AM1-B-2, pp.146-149, Aug. 2019.
- Eisuke Hanada and Takato Kudou
 “Wireless-communication demand in hospitals -Procedures for safe introduction-,”
 Proceedings of EMC Sapporo & APEMC 2019, MonPM1A.6, p.10, Jun. 2019.
- Takato Kudou, Kouki Miura, and Eisuke Hanada
 “Numerical analysis of band-selective electromagnetic shielding by using dielectric square lattice type periodic structure,”
 Proceedings of EMC Sapporo & APEMC 2019, MonPM1A.5, pp.6-9, Jun. 2019.

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