



Yoshio YAMAGUCHI, Dr. Eng.

Professor, Vice Dean

Program: Electrical and Information Engineering

Area: Information Engineering

Undergraduate: Dept. of Information Engineering

Professional Expertise

His professional expertise encompasses radar remote sensing, radar polarimetry, polarimetric scattering analysis, environmental change detection, polarimetric SAR image analysis for monitoring the planet earth. He and his group have developed “Four-component scattering power decomposition” for the utilization of polarimetric SAR image interpretation, which is one of the essential part of polarimetric SAR development. All kinds of radar technology associated with wave scattering phenomena are major topics in his laboratory.

Research Fields of Interest



Polarimetry

- Principles of radar polarimetry, Decomposition theorem of fully polarimetric SAR data

FM-CW SAR

- Fully polarimetric FM-CW radar and SAR design for precise measurement in laboratory, for calibration technique, and for detecting objects in snow and underground

Air-borne/Space-borne POLSAR

- Quad-pol data utilization, Signal processing Environmental change detection and Monitoring such as volcano, earthquake, flood, vegetation. POLSAR image decomposition

Scattering

- Scattering mechanism modeling, FD-TD scattering analysis for complex objects, verification and utilization for measured data sets

Radio Propagation

- Propagation in lossy media, underground, buildings, etc

Education

1983: Doctoral Eng. degree, Tokyo Institute of Technology, Japan

1978: Master Eng. degree, Graduate School, Tokyo Institute of Technology, Japan

1976: Bachelor Eng. degree, Dept. of Electronics Engineering, Niigata University, Japan

Professional Societies and Activities

1. Fellow, IEEE
2. Fellow, Institute of Electronics, Information and Communication Engineers (IEICE)

Awards

1. IEEE Geoscience Remote Sensing Society Education Award, 2008
2. Niigata-Nippo Cultural Award, 2009
3. Tutorial Paper Award, IEICE-Commun. Society, 2007

Major Publications

Papers

*Polarimetry

- [1] "Disaster monitoring by fully polarimetric SAR data acquired with ALOS-PALSAR," *Proc. of the IEEE*, vol. 100, no. 10, pp. 2851-2860, 2012.
- [2] "Monitoring of the 2011 March 11 off-Tohoku 9.0 earthquake with super-tsunami disaster by implementing fully polarimetric high resolution POLSAR techniques," *Proc. of the IEEE*, vol. 101, no. 3, pp. 831-846, 2013.
- [3] "Four-component scattering power decomposition with rotation of coherency matrix," *IEEE Trans. Geosci. Remote Sens.(TGRS)*, vol. 49, no. 6, 2251-2258, 2011.
- [4] "Classification of terrain by implementing the correlation coefficient in the circular polarization basis using X-band POLSAR data," *IEICE Trans. Commun.*, vol. E91-B, no. 1, 297-301, 2008
- [5] "On the utilization of fully polarimetric data in radar polarimetry," *Trans. IEICE*, vol. J89-B, no. 9, 1539-1547, 2006
- [6] "A four-component decomposition of POLSAR images based on the coherency matrix," *IEEE Geosci. Remote Sens. Letters*, vol. 3, no. 3, 292-296, 2006.
- [7] "Four-component scattering model for polarimetric SAR image decomposition," *IEEE TGRS*, vol. 43, no.8, 1699-1706, 2005
- [8] "Development of target null theory," *IEEE TGRS*, vol.39, no.2, 330-338, 2001
- [9] "Two-dimensional and full polarimetric imaging by a synthetic aperture FM-CW radar," *IEEE TGRS*, vol.33, no. 2, 421-427, 1995
- [10] "Fundamental study on synthetic aperture FM-CW radar polarimetry," *IEICE Trans. Commun.*, vol. E77-B, no.1, 73-80, 1994
- [11] "On the basic principles of radar polarimetry: The target characteristic polarization state theory of Kennaugh, Huynen's polarization fork concept, and its extension to the partially polarized case," *Proc. of the IEEE*, vol. 79, no. 10, 1538-1550, 1991

*FM-CW SAR

- [12] "Coherent decomposition of fully polarimetric FM-CW radar data," *IEICE Trans. Commun.*, vol. E91-B, no.7, 2374-2379, 2008
- [13] "Classification of target buried in the underground by radar polarimetry," *IEICE Trans. Commun.*, vol.E82-B, no. 6, 951-957, 1999
- [14] "Polarimetric detection of objects buried in snowpack by a synthetic aperture FM-CW radar," *IEEE TGRS*, vol. 34, no. 1, 45-51, 1996.
- [15] "Detection of objects buried in wet snowpack by an FM-CW radar," *IEEE TGRS*, vol. 29, no. 2, 201-208, 1991

*Air-borne/Space-borne POLSAR

- [16] "POLSAR image analysis of wetlands using a modified four-component scattering power decomposition," *IEEE TGRS*, vol. 46, no. 6, 1667-1673, 2008
- [17] "Classification of terrain by implementing the correlation

coefficient in the circular polarization basis using X-band POLSAR data," *IEICE Trans. Commun.*, vol.E91-B, no. 1, 297-301, 2008

- [18][17] "Investigation on seasonal water area change in lake Sakata based on POLSAR image analysis," *IEICE Trans. Commun.*, vol. E90-B, no. 9, 2369-2375, 2007.
- [19] "A study on polarimetric correlation coefficient for feature extraction of polarimetric SAR data," *IEICE Trans. Commun.*, vol. E88-6, no. 6, 2353-2361, 2005.
- [20] "Circular polarization correlation coefficient for detection of non-natural targets aligned not parallel to SAR flight path in the X-band POLSAR image analysis," *IEICE Trans. Commun.*, vol. E87-B, no. 10, 3050-3056, 2004
- [21] "Unsupervised land classification using H/a/TP space applied to POLSAR image analysis," *IEICE Trans. Commun.*, vol. E87-B, no. 6, 1639-1647, 2004

*Scattering

- [21] "Polarimetric scattering analysis for a finite dihedral corner reflector," *IEICE Trans. Commun.*, vol. E89-6, no. 1, 191-195, 2006

*Radio Propagation

- [22] "Experimental study of microwave transmission in snowpack," *IEEE TGRS*, vol.28, no.5, 1990
- [23] "Radio propagation characteristics in underground streets crowded with pedestrians," *IEEE Trans. Electromagnetic Compatibility*, vol. EMC-30, 2130-136, 1988
- [24] "Propagation characteristics of the dominant mode in tunnels," *Trans. IECE*, vol. J65-B, no. 4, 471-476, 1982
- [25] "Propagation characteristics of normal modes in hollow circular cylinder surrounded by dissipative medium," *Trans. IECE*, vol. J62-B no.4, 368-373, 1979

Books

- [1] Yamaguchi, Y. 2007. *Radar Polarimetry from Basics to Applications*, 182 pages, IEICE.
- [2] Yamaguchi, Y. 1998. *Polarimetric radar from basics to applications*, 189 pages, REALIZE Inc.

Book Chapters

- [1] IEICE, 2008. *Antenna Handbook*, Ohm-sha, ch. 15
- [2] Goto, N. Nakagawa, M. Itoh, K. eds. 2006 *Antenna & Radio Handbook*: Y. Yamaguchi, Chapter V-5.1, Ohm-sha, 470-474.
- [3] ERSDAC eds. 2003, *Retrieval of information from earth-observing data - polarimetric analysis*, Remote Sensing Series no. 3 for Resources and Environments, ERSDAC., 229-245.
- [4] ERSDAC eds., 2001. *Earth-observing from space*, Remote Sensing Series no. 1 for Resources and Environments, ERSDAC., 157-166.
- [5] Hosoya. Y eds., 1999. *Handbook of Wave Propagation*: Yamaguchi, Y., *Wave propagation in lossy media and tunnels*, Realize Inc., 65-84.
- [6] Sengoku, M. eds., 1995. *Wonders of electricity*, Ohm-sha.