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Education of Young Engineers in Electromagnetic, Antennas and Propagation in Japan

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1. Introduction

EM related education is not easy task for both universities and companies world-wide. This talk presents two programs, one is classical while the other is relatively new.

2. Training courses for young EM engineers

In 1994, Technical committee of Antennas and Propagation in Communication Society of IEICE Japan (TC-AP) opened a series of the training courses specially designed for younger engineers as well as seniors who newly join in this heavy topic area. It covers basic EM theory, Numerical method, Antenna design, Propagation and algorithms for wireless communications. It has been working more than 10 years and about 40 courses with total number of about 3000 engineers have been held. There are several unique features which contribute to the high quality and long-lived programs.

- Two one-day Preparatory staff meeting:
- Advance homework using a self-study textbook of more than 100 pages.
- Fees about 100-120 USD and 30 USD for the regular and the student respectively as an activity of TC-AP for membership-raising.
- Copyright kept by the lecturer; the text book is available only for the attendees.

The talk will include the latest information after the first report presented B08 in 2005 URSI GA.

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3. Integrated Doctorial Education Course

The PhD program in general has not been so popular in Japan in comparison to MS program. In 2002, the ministry of Education and Ministry of Education, Culture, Sports, Science and Technology started the 21th century Center of Excellence programs. One of the main objectives has been to enhance the PhD course and to encourage the PhD students, in the number of students, in the quality of degree holders. As for the EM-related education, we proposed the 21st Century COE Program “Phontonics Nanodevice Integrated Engineering” (FY2002-2006, Project Leader: Prof. Shigehisa Arai), which were conducted by Dept. of Electrical & Electronic Engineering, Dept. of Physical Electronics, Dept. of Communications & Integrated Systems, Graduate School of Science & Engineering and Dept. of Electronics & Applied Physics, Dept. of Information Processing, Interdisciplinary Graduate School of Science & Engineering, Tokyo Institute of Technology. It has just successfully completed and around 700 PhD students have been graduated in the program. Based upon these successes, Tokyo Institute of Technology initiated a new program “Integrated Doctorial Education Program” from 2006. In these programs, there are several new trials for the PhD course students, such as

- 3 to 6 months study experience at University in other country or domestic company.
- External Examiners
- PhD student Forum
- Research Assistant Program.

These may not be new but are not popular in Japan.

4. Conclusions

In view of explosion of wave technology in the coming information society in contrast with the world tendency of descent of EM colleagues, “how to feed the next generation in electromagnetic” seems one of the urgent task for URSI. IEICE TG-AP is also sharing this feeling and is finding the way to extend this activity. Some examples are; collaboration with Asia Pacific countries as well as IEEE AP education committee, harmonization with IEEE AP distinguished lecturer program, and also workshops in the EM related symposium ISAP. As for the PhD program, Social and cultural background in Japan is different from that in USA and EUROPE. But fostering young leaders through PhD program is highly demanded not only from academia but also from industries.

Table 1 History and statistics of the workshop for young EM engineers.

No.	Title	Lecturer	Date	Venue	Organizer	Fee Regular/Studen	Atendee
1	Antenna Analysis by Method of Moment -Beginners	H. Nakano	24-Nov-94	Tokyo Inst. Tech	TG.AP	15000/5000	70
2	Antenna Analysis by Method of Moment -Beginners	H. Nakano	31-Mar-95	Fukuoka Inst. Tech	TG.AP	15000/5000	70
3	Time Domain Analysis of EM Fields -Beginners	N. Yoshida	12-Jun-95	Tokyo Inst. Tech	TG.AP	15000/5000	80
4	Time Domain Analysis of EM Fields -Beginners	N. Yoshida	07-Jul-95	Tokyo Inst. Tech	TG.AP	15000/5000	85
5	Propagation Analysis and Measurement for Mobile Communication -Beginners	T. Takeuchi	01-Dec-95	Tokyo Inst. Tech	TG.AP	15000/5000	88
6	EM Fields and Antenna Analysis by FDTD -Intermediate	T. Uno	27-Mar-96	Tokyo Inst. Tech	TG.AP	15000/5000	80
7	EM Fields and Antenna Analysis by FDTD -Intermediate	T. Uno	17-Sep-96	Kanazawa Univ.	TG.AP	15000/5000	69
8	High Frequency Diffraction Techniques	M. Ando	28-Mar-97	Osaka Univ.	TG.AP	15000/5000	72
9	Adaptive Signal Processing and DOA Estimation -Beginners	N. Kikuma	02-Sep-97	Tokyo Inst. Tech	TG.AP	15000/5000	80
10	Adaptive Signal Processing and DOA Estimation -Beginners	N. Kikuma	30-Oct-97	Tokyo Inst. Tech	TG.AP	15000/5000	80
11	Antenna Analysis by Method of Moment -Intermediate	K. Sawaya	28-Sep-98	Kofu	TG.AP	15000/5000	77
12	Antenna Measurements -Fundamentals and Applications	T. Teshirogi	29-Mar-99	Tokyo Inst. Tech	TG.AP	15000/5000	68
13	Antenna Measurements -Fundamentals and Applications	T. Teshirogi	12-Apr-99	Tokyo Inst. Tech	TG.AP	15000/5000	73
14	Wideband Mobile Propagation and Modeling in Multipath Environment	Y. Karasawa	06-Sep-99	Tokyo Inst. Tech	TG.AP	15000/5000	70
15	Wideband Mobile Propagation and Modeling in Multipath Environment	Y. Karasawa	13-Oct-99	Tokyo Inst. Tech	TG.AP	13000/4000	80
16	Antenna Analysis and Practical Design by FDTD	H. Arai	27-Mar-00	Hiroshima	TG.AP	13000/4000	106
17	Antenna Analysis and Practical Design by FDTD	H. Arai	28-Apr-00	Tokyo Inst. Tech	TG.AP	13000/4000	
18	Wideband Mobile Propagation and Modeling in Multipath Environment	Y. Karasawa	29-Sep-00	Nagoya Inst. Tech.	TG.AP	13000/4000	49
R1	Antenna Analysis by Method of Moment -Beginners	H. Nakano	29-Nov-00	Tokyo NTT	IEEE AP-S JC	10000/3000	62
19	Dyadic Greens Functions in Eigen Function Expansion and Design of Waveguide Slot Ar	J. Hirokawa	27-Apr-01	Tokyo Inst. Tech	TG.AP	13000/4000	63
20	Polarimetric Radars -Beginners	Y. Yamaguc	17-Sep-01	Elect. Commun. Univ	TG.AP	13000/4000	64
R2	EM Fields and Antenna Analysis by FDTD -Intermediate	T. Uno	13-Nov-01	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	75
21	Fundamentals of Finite Element Method and Application to EM Analysis	M. Koshiba	26-Apr-02	Tokyo Inst. Tech	TG.AP	13000/4000	77
R3	Adaptive Signal Processing and DOA Estimation -Beginners	N. Kikuma	12-Jun-02	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	77
R4	Adaptive Signal Processing and DOA Estimation -Beginners	N. Kikuma	02-Jul-02	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	77
22	Adaptive Antennas for Mobile Communications -Intermediate	Y. Ogawa	05-Sep-02	Tokyo Inst. Tech	TG.AP	13000/4000	78
23	Adaptive Antennas for Mobile Communications -Intermediate	Y. Ogawa	04-Oct-02	Tokyo Inst. Tech	TG.AP	13000/4000	78
24	Biological Equivalent Phantom and Evaluation of Antennas	K. Ito	16-May-03	Tokyo Inst. Tech	TG.AP	13000/4000	78
R5	Antenna Analysis by Method of Moment -Beginners	H. Nakano	11-Aug-03	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	78
R6	Antenna Analysis by Method of Moment -Intermediate	K. Sawaya	12-Aug-03	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	78
25	Microstrip Antennas -Beginners	M. Haneishi	16-Apr-04	Tokyo Inst. Tech	TG.AP	13000/4000	150
R7	Wideband Mobile Propagation and Modeling in Multipath Environment	Y. Karasawa	01-Jul-04	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	128
R7	Adaptive Signal Processing and DOA Estimation -Beginners	N. Kikuma	02-Jul-04	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	
26	Fundamentals of MIMO Systems	T. Ohgane	29-Nov-04	Tokyo Inst. Tech	TG.AP	13000/4000	136
27	Fundamentals of MIMO Systems	T. Ohgane	17-Dec-04	Tokyo Inst. Tech	TG.AP	13000/4000	129
28	Analysis and Design of Microstrip Antennas	Y. Suzuki	26-May-05	Tokyo Inst. Tech	TG.AP	13000/4000	96
R8	Antenna Measurements -Fundamentals and Applications	T. Teshirogi	13-Oct-05	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	78
29	Small Antennas -Fundamentals and Applications	H. Morishita	28-Apr-06	Tokyo Inst. Tech	TG.AP	13000/3000	120
30	Super Resolution DOA Estimation -Fundamentals and Applications	N. Kikuma H. Yamada	2-Oct-06 3-Oct-06	Tokyo Inst. Tech	TG.AP	20000/5000	126
R9	Fundamentals of MIMO Systems	T. Ohgane	22-Nov-06	Tokyo Inst. Tech	IEEE AP-S JC	10000/3000	105
31	Array Antenna Design -Beginners	T. Hori	10-May-07	Tokyo Inst. Tech	TG.AP	13000/3000	78

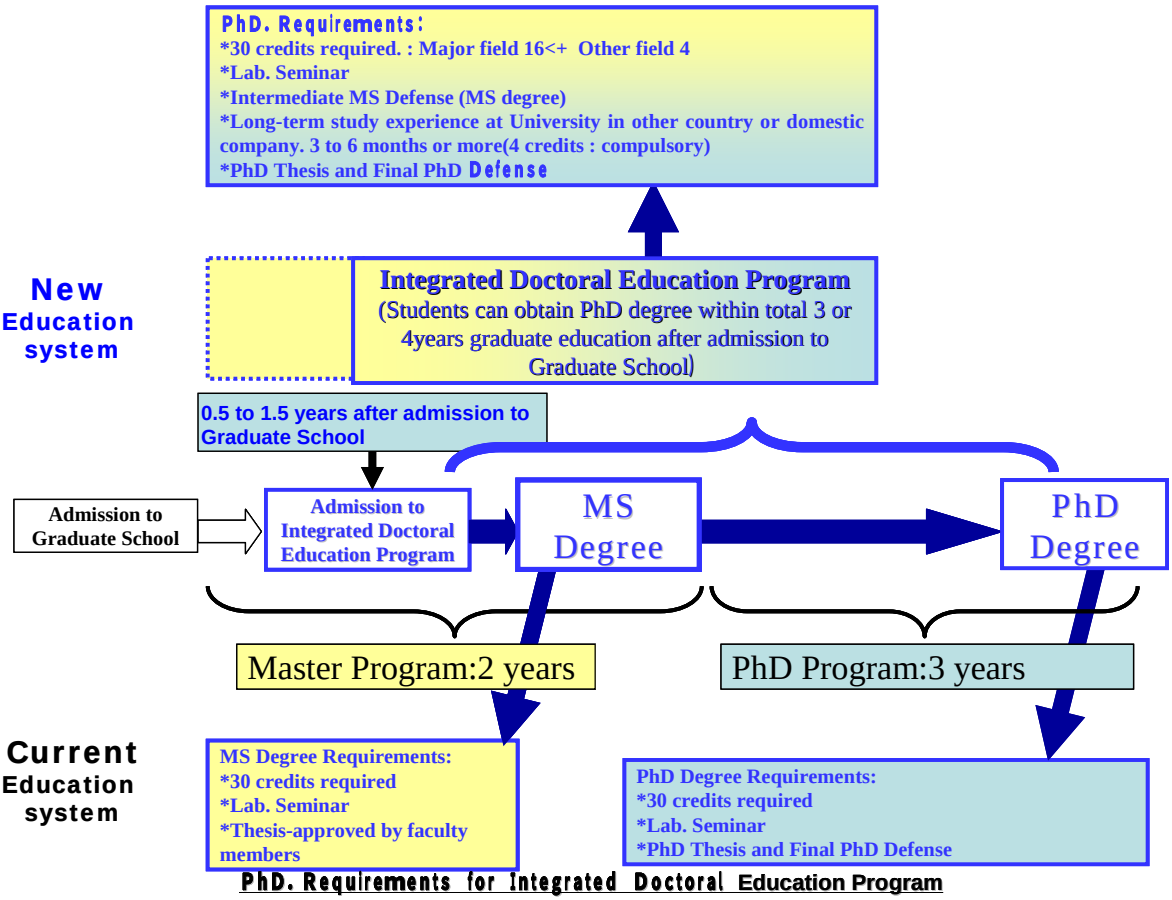

Figure 1 Integrated Doctorial Education Program at Tokyo Tech

Acknowledgments

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