

EuCAP2011 Short Course Proposal

Instructor: Ondrej Fiser

1. Course header

a. Course title:

Radio and Optical Waves Propagation Modelling for Scientists and Engineers

b. Course type: ½ day

c. Contact person, name: Ondrej Fiser, Ph.D., Assoc.Prof..

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h. <http://www.ufa.cas.cz/html/meteo/lide/fiser.html>

2. Course description

Who should attend this course and why

The course is devoted typically for microwave and mm wave link (terrestrial as well as satellite) designers, FSO link designers, propagation specialists and engineers, physicists, radio-climatologists, teachers.

The attendants should receive an overview of propagation phenomena in the atmosphere for both radio and optical signals with respect to the wave propagation modelling. They will be able to predict the atmospheric attenuation from meteorological parameters; they also receive algorithms enabling this. The most important phenomena, such as rain, cloud, water vapour, fog and wind will be emphasized.

3. Course topics

1. Rain attenuation

1.1 Scattering of electromagnetic wave on a single rain drop (Rayleigh approximate scattering, Mie approximate scattering, more exact scattering)

1.2 Deduction of formula to compute specific attenuation and phase delay due to rain, approximate formulas, ITU-R formulas

1.3 Overview of models (prediction methods) for cumulative distribution (CD) of rain attenuation on microwave and mm links (ITU-R model, Misme-Fimbel model and many others)

1.4 Details of rain attenuation estimation on satellite (slant) paths respecting the height profile of the atmosphere

1.5 Focus on drop size distribution (DSD) and its importance in radio wave propagation, analytical models of DSD

1.6 Practical computation of rain attenuation, examples of results, annual statistics, month statistics, diurnal and seasonal variation

2. Cloud and fog attenuation

2.1 Derivation of formulas computing instantaneous cloud attenuation

2.2 Engineering methods estimating cloud attenuation distribution, examples

3. Water vapour attenuation

3.1 Formulas computing the specific water vapour attenuation

3.2 Practical methods estimating distribution of water vapour attenuation

4. Combination of attenuation effects

5. Atmospheric attenuation on free space optics (FSO) links

5.1 Fog attenuation

5.2 Rain Attenuation

5.3 Attenuation due to wind turbulences

Means of instruction (if different from slides): slides (datap projector), flip chart

Do you plan to use a software? Yes, only my private software

3. Course instructors

See CV below

4. Additional Information (optional)

Has this or a similar course already been offered at a conference? If so: What conference (and what year)? How many people attended it?

Yes, EuCAP 2007 in Edinburgh, 2 attendants

CV

Course Instructor: Ondřej Fišer, PhD., Assoc. Prof.

*1952, graduated from the Faculty of Electrical Engineering of the Czech Technical University in Prague in 1977, specialisation Theory of Electromagnetic Field, A&P

-Ph.D. thesis "Interaction of Electromagnetic Field with Rain Medium with Respect to Satellite Links Rain Attenuation Prediction" defended in 1984

-Senior lectureship thesis „Influence of Rain on Reliability of Radio-communications“ was defended at the University of Pardubice in 2004

-Member of the Society for Radio Electronic Engineering

-Secretary of the URSI Czech National Committee

-He went through six professional fellowships abroad (Politecnico di Milano, Helsinki University of Technology, Rutherford Appleton Laboratory, University of Essex, University of Bath and Fondazione Ugo Bordoni)

Employment

-He worked within the Satellite Communication Laboratory (1978-1994) of the PTT Research Institute (since 1993 TESTCOM) as the scientific - technical researcher.

-Since 1994 he has been with the Institute of the Atmospheric Physics (IAP) – Meteorological dept. of the Academy of Sciences of Czech Republic.

-He has been teaching “The high frequency technology” and “Electromagnetism” at the Faculty of Electrical Engineering and Informatics of the University of Pardubice since 2002

Projects

In his branch, he took part in a number of international projects with international participation, e.g. OPEX (Olympus Propagation Experiment, 1991-1994), COST 235 (1991-1993), PADRE (Polarisation and Doppler Radar Experiment, project of the European Commission, 1994-1996), COST 255 (1996-1999, a member of the Management Committee), COST 280 (2001-2005, a member of the Management Committee), COST 75 (1997), RADHYD (1996-1998).

At the IAP he was responsible for the work on 5 grants as the grant holder or co-holder, for example “Processing and mapping of meteorological parameters for radiowave propagation modelling through troposphere“

Professional interests

Radio-wave propagation through the atmosphere, radar meteorology and also radio-climatology, computer programming and teaching.

Author of many publications and contributions on radiowave propagation and radar meteorology.

For more see <http://www.ufa.cas.cz/html/meteo/lide/fiser.html>