

Title: Selected Topics in Mobile Fading Channel Modelling
Speaker: Matthias Pätzold
Affiliation: Agder University College, Grimstad, Norway

Rational: The overall objective of the tutorial:

A precise knowledge of mobile radio channels is indispensable for the development, evaluation, and test of present and future mobile radio communication systems. After all, from digital modulation techniques over channel coding to network aspects, nearly all relevant components of a mobile radio system are determined by the propagation characteristics of the channel. This tutorial deals with the modelling, analysis, and simulation of mobile fading channels. It provides a fundamental understanding of many issues that are currently being investigated in the area of mobile fading channel modelling. Several classes of single-input single-output (SISO), and multiple-input multiple-output (MIMO) fading channels are treated in detail. Furthermore, the description of efficient methods for the simulation of mobile radio channels is in the centre of attention.

Besides knowledge of statistics, also basic knowledge of systems theory is assumed.

Outline: A brief structure of the tutorial:

Introduction, basic concepts of fading channel modelling, fundamentals of stochastic and deterministic channel models, stationarity and ergodicity of fading channel models, parameter computation methods for sum-of-sinusoids-based channel models, test and performance evaluation of fading channel simulators, frequency-nonselctive fading channels (Rayleigh channels, Rice channels, generalized Rice channels, lognormal channels, Nakagami channels, Suzuki channels), design of multiple uncorrelated Rayleigh fading waveforms, frequency-hopping fading channels, frequency-selective fading channels (WSSUS models, DGUS models, COST 207 models), methods for modelling of specified and measured multipath power delay profiles, modelling and simulation of MIMO mobile radio channels, geometrical-based MIMO channels (one-ring model, two-ring model, elliptical model), mobile-to-mobile MIMO channels, standardized MIMO channel models (SCM, SUI, TGn).

Intended audience:

The tutorial is mainly addressed to Ph.D. students and scientists working on present problems of channel modelling. In addition to that, the tutorial is also suitable to engineers and physicists, who work in the wireless communications field and therefore have a professional interest in subjects dealing with mobile fading channels. Last, but not least, the tutorial is addressed to master students of electrical engineering, who are specializing in mobile radio communications.

Biography of the speaker:

Matthias Pätzold received the Dipl.-Ing. and Dr.-Ing. degrees in electrical engineering from Ruhr-University Bochum, Bochum, Germany, in 1985 and 1989, respectively, and the habil. degree in communications engineering from the Technical University of Hamburg-Harburg, Hamburg, Germany, in 1998. From 1990 to 1992, he was with ANT Nachrichtentechnik GmbH, Backnang, Germany, where he was engaged in digital satellite communications. From 1992 to 2001, he was with the Department of Digital Networks at the Technical University

Hamburg-Harburg. Since 2001, he has been a full professor of mobile communications with Agder University College , Grimstad , Norway. He is author of the books "Mobile Radio Channels - Modelling, Analysis, and Simulation" (in German) (Wiesbaden, Germany: Vieweg, 1999) and "Mobile Fading Channels" (Chichester , U.K. : Wiley & Sons, 2002). His current research interests include mobile radio communications, especially multipath fading channel modelling, multi-input multi-output (MIMO) systems, MIMO-OFDM, and space-time coding techniques for fading channels.

Prof. Pätzold received the "1998 Neal Shepherd Memorial Best Propagation Paper Award" from the IEEE Vehicular Technology Society and was also the recipient of the "2002 Neal Shepherd Memorial Best Propagation Paper Award". He is the recipient of the "2003 Excellent Paper Award" of the IEEE Int. Symp. on Personal, Indoor and Mobile Radio Communications (PIMRC\03) in Beijing , China . He also received the "Best Paper Award" of the 8th Int. Symp. on Wireless Personal Multimedia Communications (WPMC'05) in Aalborg , Denmark , as well as the "Best Paper Award" of the 3rd International Symposium on Wireless Communication Systems (ISWCS'06) in Valencia, Spain.