Helpful Hints for Preparing IEEE Papers

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I. Helpful Hints for Preparing IEEE Papers

A. Abstract

The abstract should be limited to 50–200 words and should concisely state what was done, how it was done, principal results, and their significance.

B. Figures and Tables

Position figures and tables at the top or bottom of the column (page). Avoid placing them in the middle of the column (page). Large figures and tables may span across both columns. Figure captions should be below the figures; table captions should be above the tables. Avoid placing figures and tables before their first mention in the text. Use the abbreviation "Fig. 1," even at the beginning of a sentence.

Figure axis labels are often a source of confusion. Try to use words rather than symbols. As an example, write the quantity "Bit error probability," or "Bit error probability P_b," not just "P_b." Put units in parentheses. Do not label axes with units. In the example, write "Signal-to-noise ratio E_b/N_0 (dB)." Do not label axes with a ratio of quantities and units. For example, write "Frequency (Hz)," not "Frequency/Hz." Multipliers can be especially confusing. Write "Frequency (kHz)" or "Frequency (10^3 Hz)." Do not write "Frequency (Hz x 1000)." Figure labels should be legible, about 10-point type.

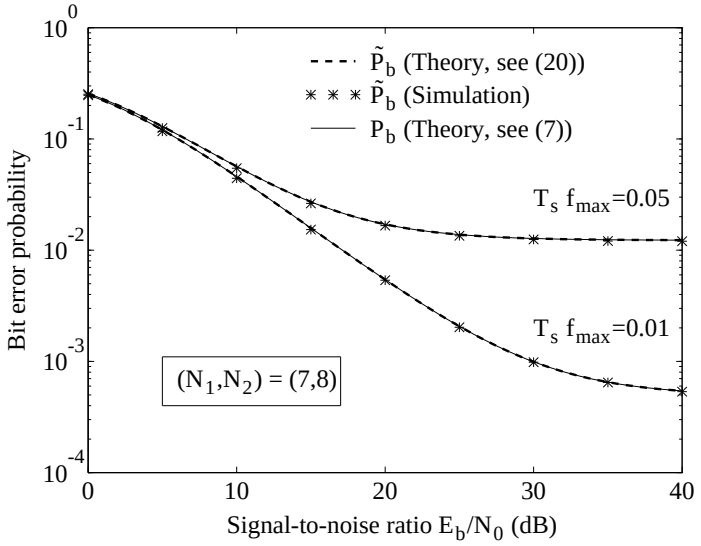

Fig. 1. Bit error probability P_b for non-coherent DPSK systems by using the MEDS.

TABLE I
PARAMETERS OF THE SIMULATION MODEL

i	n	$f_{i,n}$(Hz)	$c_{i,n}$	$\theta_{i,n}$(rad)
1	1			
1	2			
1	3			
1	4			
1	5			
1	6			
1	7			
1	8			
1	9			

C. Footnotes

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the page (column) in which it was cited. Do not put footnotes in the reference list. Use letters for table footnotes. It is not necessary to mention the authors of a reference unless the mention is relevant to the text.

D. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title of the paper unless they are unavoidable.

E. Section Headings

Primary section headings within papers are enumerated by Roman numerals and are centered above the text. For the purpose of typing the manuscript only, primary headings should be capital letters. Sample:

I. PRIMARY HEADING

(TEXT)

Secondary section headings are enumerated by capital letters followed by periods ("A.", "B.", etc.) and are flush left above their sections. The first letter of each word is capitalized. In print the headings will be italics. Sample.

A. Secondary Heading

(TEXT)

Tertiary section headings are enumerated by Arabic numerals followed by a parenthesis. They are indented, run into the text in their sections, and are followed by a colon. The first

letter of each important word is capitalized. Sample:

1) Tertiary Headings: (TEXT)

Quaternary section headings are rarely necessary but are perfectly acceptable if required. They are identical to tertiary headings except that lowercase letters are used as labels and only the first letter of the headings is capitalized. Sample:

a) Quaternary heading: (TEXT)

F. Equations

Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Use parentheses to avoid ambiguities in denominators. Punctuate equations with periods but not commas when they are part of a sentence, as in

$$c = \exp(a/b) \tag{1}$$

and

$$d = e + f\,. \tag{2}$$

There is, however, other punctuation permitted in the equation itself and between an equation and its condition; there is a comma and a 2 em space before the condition. Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Use"(1),"not "Eq. (1)" or "equation (1),"except at the beginning of a sentence: "Equation (1) is . . . "

G. Other Recommendations

The Roman numerals used to number the section headings are optional. If you do use them, number INTRODUCTION, but not ACKNOWLEDGMENT and REFERENCES, and begin Subheadings with letters. Use two spaces after periods (full stops). Hyphenate complex modifiers: "mean-square error" or "zero-forcing filter." Avoid dangling participles, such as: "Using (1), the variance was calculated." Write instead:"The variance was calculated by using (1)," or: "Using (1), we calculated the variance."

Use a zero before decimal points: "0.25," not ".25." Use "cm^3," not "cc." Do not mix complete spellings and abbreviations of units: "Wb/m^2" or "webers per square meter," not "webers/m^2." The abbreviation for "seconds" is "s" not "sec." Spell units when they appear in text: ". . . a few seconds," not " . . . a few s."

In American English, periods and commas are within quotation marks, like "this period." Other punctuation is "outside"! Avoid contractions; for example write "do not" instead of "don't." The serial comma is preferred: "A, B, and C" instead of "A, B and C."

If you wish, you may write in the first person plural and use the active voice ("We observe that . . . " instead of "It was observed that . . . ").

For simplicity in international usage, IEEE practice is to separate numbers of more than four digits into groups of three on either side of the decimal point, separated by a space. If

the magnitude of a number is less than one, the decimal sign should be preceded by a zero. Examples: 12 531 7465 9.2163 0.102 834.

H. Units

Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive."

Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.

I. Some Common Mistakes

The word "data" is plural not singular. The subscript for the carrier frequency f_0 is zero, not a lowercase letter "o." In American English, periods and commas are within quotation marks, like "this period." A parenthetical *statement* at the end of a sentence is punctuated outside of the closing parentheses (like this). (A parenthetical *sentence* is punctuated within the parentheses.) A graph within a graph is an "inset," not an "insert." The word alternatively is preferred to the word "alternately" (unless you really mean something that alternates). Use the word "whereas" instead of "while" (unless you are referring to simultaneous events). Use the word "whereas" instead of "while" (unless you are referring to simultaneous events). Do not use the word "essentially" to mean "approximately" or "effectively." Be aware of the different meaning of the homophones "affect" (usually a verb) and "effect" (usually a noun), "complement" and "compliment," "discreet" and "discrete," "principal" and "principle." Do not confuse "imply" and "infer." Prefixes such as "non," "sub," "micro," "multi," and "ultra" are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the "et" in the Latin abbreviation "*et al.* (it is also italicized)." The abbreviation "i.e.," means "that is," and the abbreviation "e.g." means "for example" (these abbreviations are not italicized).

J. Conclusion

Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

K. Acknowledgment

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g." Try to avoid the stilted expression, "One of us (R. B. G) thanks . . . " Instead, try "R. B. G. thanks . . . " Put sponsor acknowledgments in the unnumbered footnote on the first page.

L. References

Number citations consecutively in square brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]. Do not use "Ref. [3]" or "reference [3]," except at the beginning of a sentence: "Reference [3] was the first . . . ". It is not necessary to mention the authors of a reference unless the mention is relevant to the text.

IEEE Transactions no longer use a journal prefix before the volume number. For example, use "IEEE *Trans. Veh. Technol.*, vol. 47," not "vol. VT-47."

Give all authors' names; do not use "et al." unless there are six authors or more. Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished." Papers that have been accepted for publication should be cited as "in press." Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation.

- Book: author(s), book title (italicized), page numbers, publisher, city, year.
- Journal paper: author(s), paper title (in quotes), journal name, volume number, page number (inclusive), year.
- Proceeding paper or chapter in an edited book: author(s), paper or chapter title (in quotes), volume title (italicized), editor(s), volume number (if applicable), page numbers (inclusive), publisher, city, year.

Some correct formats for various types of references are as follows.

Books:

[1] G. O. Young, "Synthetic structure of industrial plastics," in *Plastics*, 2nd ed., vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15–64.

[2] W. K. Chen, *Linear Networks and Systems.* Belmont, CA: Wadsworth, 1993, pp. 123–135.

Periodicals:

[3] J. U. Duncombe, "Infrared navigation—Part I: An assessment of feasibility," in *IEEE Trans. Electron Devices,* vol. ED-11, pp. 34–39, Jan. 1959.

[4] E. P. Wigner, "Theory and travelling-wave optical laser," *Phys. Rev.*, vol. 134, pp. A635–A646, Dec. 1965.

[5] E. H. Miller, "A note on reflector arrays," *IEEE Trans. Antennas Propagat.*, to be published.

Articles from Conference Proceedings (published):

[6] D. B. Payne and J. R. Stern, "Wavelength-switched passively coupled single-mode optical network," in *Proc. IOOC-ECOC,* 1985, pp. 585–590, Jan. 1959.

Papers Presented at Conferences (unpublished):

[7] D. Eberhard and E. Voges, "Digital single sideband detection for interferometric sensors," presented at the 2nd Int. Conf. Optical Fiber Sensors, Stuttgart, Germany, 1984.

Standards/Patents:

[8] G. Brandli and M. Dick, "Alternating current fed power supply," U. S. Patent 4 084 217, Nov. 4, 1978.

Technical Reports:

[9] E. E. Reber, R. L. Mitchell, and C. J. Carter, "Oxygen absorption in the Earth's atmosphere," Aerospace Corp., Los Angeles, CA, Tech. Rep. TR-0200 (4230-46)-3, Nov. 1968.

II. Idioms

A. General Phrases

- As a result of the above ...
- Starting from the likelihood, we can show ...
- As an aside, we want to mention that if the ...
- ... uniformly distributed over $[0, 2\pi]$.
- In other words ...
- As a consequence of our assumptions, the ...
- The reason for using the error function rather than the complementary error function will become apparent later.
- In the sequel, we assume that ...
- In the sequel, one should define the ...
- A definition of the direction spread analogous to that of the delay and Doppler spreads can be obtained as follows.
- This notation has the merit of being simple and mnemonic.
- $||\cdot||$ denotes the Euclidean norm.
- $|x(t)|$ is the magnitude of the complex signal $x(t)$.
- The same remark applies to the process ...
- It should be pointed out here that terms "white" and "band-limited white" refer to the spectral shape of the process.
- The total number of crossings ... becomes the level-crossing rate.
- There is no closed-form expression for this integral.
- A considerable simplification occurs when $a = 0$. For this case, we find ...
- ...the overdot indicates time derivative ($\dot{\psi}(0)$).
- ...the primes denote differentiations ($\psi''(0)$).
- The remainder of this section is narrowly focused on the specialized design methods that are employed.
- The Rice distribution also can be approximated by the Nakagami distribution.
- ... is advantageous with respect to the implementation of the receiver hardware, cf., e.g., [16] and [17] for a detailed rational.
- Given the procedure above, ...
- The BCH codes were presented in [18].
- From the theory developed before, it is seen that ...
- For simplicity, the four symbols ...
- By referring to the previous discussion, we ...
- On the contrary, if we ...
- To make this evident, ...
- It should also be observed that ...
- As we have seen previously, d_{free} is the most important parameter ...
- ... that these signals have unit energy, that is, they are such that ...

- The performance of . . . depends to a large extent on . . .
- The Rayleigh process accounts for the fast fading.
- . . . , where $x(t)$ is the input and $y(t)$ is the output and $X(f)$ and $Y(f)$ are their respective Fourier transforms.
- It can be shown [1] that the rate of change of r, $\dot{r}$, is distributed normally.
- It turned out that this model showed good comparison to measurements.
- It should be noted that . . .
- The transmitted signal $s(t)$ is deteriorated by multiplicative fading $a(t)$.
- . . . we may reason that . . .
- . . . zero-mean, white Gaussian process . . .
- . . . , where $r_{xy}(\tau)$ is the cross-correlation function between the processes $x(t)$ and $y(t)$.
- The function $r_{zz}(\tau)$ can be expressed in terms of the cross-correlation $r_{xy}(\tau)$ between $x(t)$ and $y(t)$.
- In the remainder of this section, . . .
- Sometimes this distribution is called a Suzuki distribution, after the original work by Suzuki.
- The envelope of a fading signal contains both long-term fading and short-term fading components.
- For notational brevity, the index m will be omitted when possible.
- Unfortunately, to the best of the author's knowledge, . . .
- . . . no comparison between the channel model and the experimental data has been reported in the literature.
- For ease of analysis, we . . .
- Viewing the problem another way, if the . . .
- It is further assumed that . . . (or we further assume that . . .)
- Unless otherwise stated, it will be assumed that . . .
- . . . is beyond the scope of this paper, but some aspects important for . . . shall be highlighted below.

B. Phrases Used in Abstracts and Introductions

- The paper presents results stemming from an analysis of . . .
- This paper is concerned with the . . .
- The purpose of this paper is to give precise analytical expressions for the statistical properties of Jakes' fading simulator.
- This paper describes a statistical model in terms of its probability density function (PDF), level-crossing rate (LCR), and average duration of fades (ADF).
- This paper has the following structure. Section II . . .
- The paper is structured as follows. Section II . . .
- This paper is organized into 4 sections. Section I provides a general introduction to . . .
- We discuss the impact of these parameters on . . .
- The analysis in [1] carries this further by considering the effect of . . .
- Another method for overcoming the sensitivity to the . . .

- Section 5 provides a treatment of stochastic processes.
- Section 5 provides an analysis of stochastic processes.
- We first consider the transmission ...
- For simplicity's sake, here we restrict our attention to the case in which the arguments ...
- As we will see, the bit error probability is ...
- In the literature ...
- ... provides some guidelines on how ...
- In this study, the goal is to ...
- This paper is motivated by the need for fundamental understanding of ...
- This paper is comprised of three parts. First the information theoretical background is given followed by ...

C. Phrases Used in Connection with Equations

- This relation reads as follows: ...
- This condition holds if $a \ll 1$.
- Equation (1) states that X is a particular ...
- Also, using (1) and starting with ...
- Starting with (1) and taking $a + b$, we can show that ...
- ..., where Δ_τ is a measure *of* the time delay spread.
- On the analogy of (1) ...
- By analogy with (1) ...
- Equation (1) allows further observations: when $x \to 0$, $f(x)$ tends to ...
- Equation (1) can be put in the form:
- The average square length

$$E' = \frac{1}{M'} \sum_{x \in \Omega'} ||x||^2$$

will be referred to hereafter as the average signal energy.

- $Pr\{\cdot\}$ denotes the probability of the event inside the brace.
- $(\dots)$ is a class of processes that goes back to Rice's sum of sinusoids.
- That is, if A has two columns, the range space ...
- Also note that $a(\theta)$ lies within ...
- The preceding equation can be interpreted by saying that ...
- A simple computation yields the expression ...
- The preceding equation shows that ...
- Performing the substitution $y = \ldots$, the following expression is obtained ...
- Thus it follows from this result, and from $(\dots)$, that ...
- It is an immediate consequence of this definition, and of the results in the preceding section, that ...
- In this case, we may write ...
- It then follows that $(\dots)$ becomes ...

- With this results in mind, we can then write ...
- On comparing (...) and (...), we conclude that ...
- We study the distribution of x under the condition that ...
- In this case, we can resort to the result in (1) ...
- After straightforward algebraic and trigonometric substitutions, the following equation is obtained ...
- Beginning with the JPDF ...
- Consequently, the probability density of ... is ...
- Let $\mu_\rho(t)$ denote a stationary random process consisting of a constant ρ plus stationary Gaussian noise, $\mu(t)$, of zero mean and unit variance. Thus,

$$\mu_\rho(t) = \mu(t) + \rho$$

- Thereby, θ denotes a random phase angle which is distributed uniformly in the interval $[-\pi, \pi)$.
- We just need to use uncorrelated noise sources ...
- The Nakagami distribution often leads to closed form analytical expressions and insights that are otherwise unattainable.
- Consider the following choice for α with the objective yielding uncorrelated wave forms ...
- A dual extension which is also focused on is the ...
- ... τ being the difference $t_2 - t_1$.
- We start by deriving ...
- Then, from (...), we can deduce that ...
- A lower (upper) bound on the probability of error ...
- A sequence $x(n)$ is defined to be periodic with period N if $x(n) = x(n + N)$ for all n.
- We conclude that when $R_c < R$, the average probability of error $P_e \to 0$ as the code block length $n \to \infty$.
- Consequently, $P_e \to 0$ as $T \to \infty$.
- The delta function $\delta(t)$ is defined as a functional assigning to a function $x(t)$, continuous at the origin, the value $x(0)$, i.e.,

$$\int_{-\infty}^{\infty} x(t)\delta(t)dt = x(0)$$

- ... in the range of 0 to 30 dB.
- ... where $E\{\cdot\}$ denotes the expected value operator (or expectation operator).
- The non-negative square roots of the eigenvalues of the matrix $\mathbf{H}$ are also referred to as the singular values of $\mathbf{H}$.

D. Phrases Used in Connection with Figures

- ... as can be seen from Fig. 1.
- For comparative purposes, we have also plotted the performance curves for ...
- Fig. 1 impressively shows the excellent accordance between the theoretical approximation $p(x)$ and the measured data.
- As it is readily apparent in the graph, ...
- Fig. 1 illustrates $p(x)$ for several values of α.

- The function $p(x)$ is plotted as a function of x for various values of α in Fig. 1.
- The cross-correlations are evident from visual inspection of the plots.
- Fig. 1(a) and (b) illustrates ...
- Figs. 1 and 2 ...
- ... is shown in Fig. 1 in which α stands for ...
- ... is shown in Fig. 1(a) and (b), respectively.
- By using Fig. 1, the robustness of the various velocity estimators to the scattering distribution has been summarized by the ranking in Table 1.
- Fig. 1 plots the cdf $F(x)$ against (or versus) the symbol energy-to-noise ratio γ.
- Again, good agreement between approximation and simulation results is observed.
- We note from inspection of Fig. 1 that ....
- For the purpose of comparison ...
- For illustrative purposes, ...
- Our theoretical distributions line up exactly with the simulation results.

III. Miscellaneous

A. Words with a Hyphen

- real-world
- so-called
- time-variant, time-varying
- well-known
- frequency-nonselective ; frequency-selective
- zeroth-order
- cross-correlation function (*but* autocorrelation function)
- discrete-time
- time-consuming
- narrow-band, wide-band
- quasi-nonperiodic

B. Words without a Hyphen

- zero mean (*but* zero-mean process)
- delta function
- cross correlation (*but* cross-correlation function)

C. Compound Words

- nonzero

- cannot
- nonstationary
- nonperiodic

D. Plural and Singular

- ... from Figs. 8(a) and 9(b) ...
- ... in Fig. 12(a) and (b), respectively.
- ... a and b are used in (1) and (2), respectively.

E. Comma Rules

- ..., e.g., ...
- ..., but
- ..., i.e., ...
- ...let us assume that ...or ...due to the fact that ...
- ...a, b, and c ...
- 1,234.45
- ..., which ...

Remark: If the relative clause is necessary for the understanding of the sentence.

F. References

- [1], [2]
- [1]–[5]
- ...in Section III-A ...
- In this section, we ...
- [see Fig. 1(a)]

G. Abbreviations

- PSD (power spectral density)
- 2nd, 3rd, nth

H. American English (AE) and British English (BE)

- AE/BE: analyze/analyse)
- AE/BE: modeling/modelling)
- AE/BE: fulfill/fulfil)
- AE/BE: acknowledgment/acknowledgement)
- AE/BE: behavior/behaviour
- AE/BE: center/centre

I. Synonyms

- is called = is referred to as = is said to be
- in the following = in the sequel
- analogously to = similarly to = on the analogy of

J. Common Mistakes

- realization

K. Hyphen and Dash

- small hyphen (LaTeX-code: -): used for separating words, e.g., quasi-nonperiodic
- large hyphen (LaTeX-code: --): used for lists, e.g., Eqs. (1)–(4)
- dash (LaTeX-code: ---): used to insert parts of sentences

Example: ...the properties of average—such as correlation functions—are helpful for ...

IV. Helpful Latex Hints

A. Equations

- Equations numbered by (3a), (3b), etc.:

$$y_1 = ax + b \tag{3a}$$
$$y_2 = cx + d \tag{3b}$$
$$y_3 = ex + f\,. \tag{3c}$$

LaTeX-code (`eqnalph.sty` required):

```
\eqnalph
\begin{eqnarray}
 y_1 & = & a x + b \\
 y_2 & = & c x + d \\
 y_3 & = & e x + f \,.
\end{eqnarray}
\eqnreset
```

- Two equations in one line:

$$y_1 = ax + b \quad \text{and} \quad y_2 = cx + d \tag{4a,b}$$
$$y_3 = ex + f \quad \text{and} \quad y_4 = gx + h\,. \tag{4c,d}$$

LaTeX-code (`eqnab.sty` required):

```
\begin{eqnab}
 y_1 = a x + b & \mbox{and} & y_2 = c x + d \\
 y_3 = e x + f & \mbox{and} & y_4 = g x + h \,.
\end{eqnab}
```

- In the equations given above, we have used `fleqn.sty` to obtain flush left equations (with a margin). Without using `fleqn.sty`, the equations would be centered.

B. Figures

To include figures in PS or EPS format, the style file `epsf.sty` or `graphicx.sty` is required. It is recommended to put the postscript files of the figures in an extra subdirectory, in particular if there are many of them.

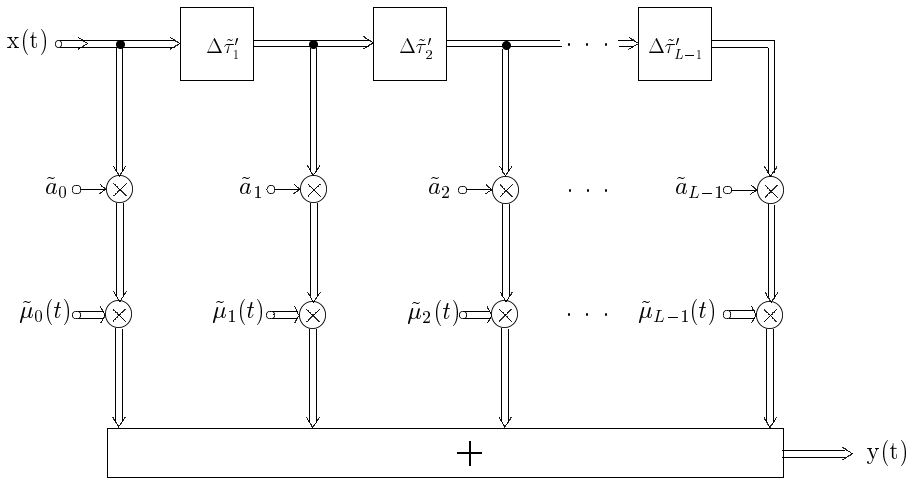

Fig. 2. Deterministic simulation model for a frequency-selective mobile fading channel in the equivalent baseband.

LaTeX-code:

- Using `epsf.sty`:

```
\begin{figure}[htb]
\begin{center}
\begin{minipage}[t]{12cm}
\epsfxsize=12cm\epsffile{fig/fig2.eps}
\end{minipage}
\end{center}
\caption[Deterministic simulation model for a frequency-selective
mobile fading channel in the equivalent baseband]{
\begin{bild} Deterministic simulation model for a frequency-selective
mobile fading channel in the equivalent baseband.
\end{bild}
} \label{fig2}
\end{figure}
```

- Using `graphicx.sty`:

```
\begin{figure}[htb]
\begin{center}
\includegraphics[width=12cm]{fig/fig2.eps}
\end{center}
\caption[Deterministic simulation model for a frequency-selective
mobile fading channel in the equivalent baseband]{
\begin{bild} Deterministic simulation model for a frequency-selective
mobile fading channel in the equivalent baseband.
\end{bild}
} \label{fig2}
\end{figure}
```

where the environment `bild` is defined as follows (it should be included in the header of the TeX file after `\textwidth` was defined):

```
\newlength{\tlaenge}
\newlength{\laenge}
\newenvironment{bild}{\setlength{\laenge}{\textwidth}
\settowidth{\tlaenge}{\figurestring\thefigure:\hspace{3.2ex}}
\addtolength{\laenge}{-\tlaenge}
\begin{minipage}[t]{\laenge}}{\end{minipage}}
```

Note that `\label{}` has to be included in the LaTeX-code below `\caption{}`.

LaTeX-code:

```
\begin{figure}[tb]
\begin{center}
\begin{minipage}[t]{6cm}
```

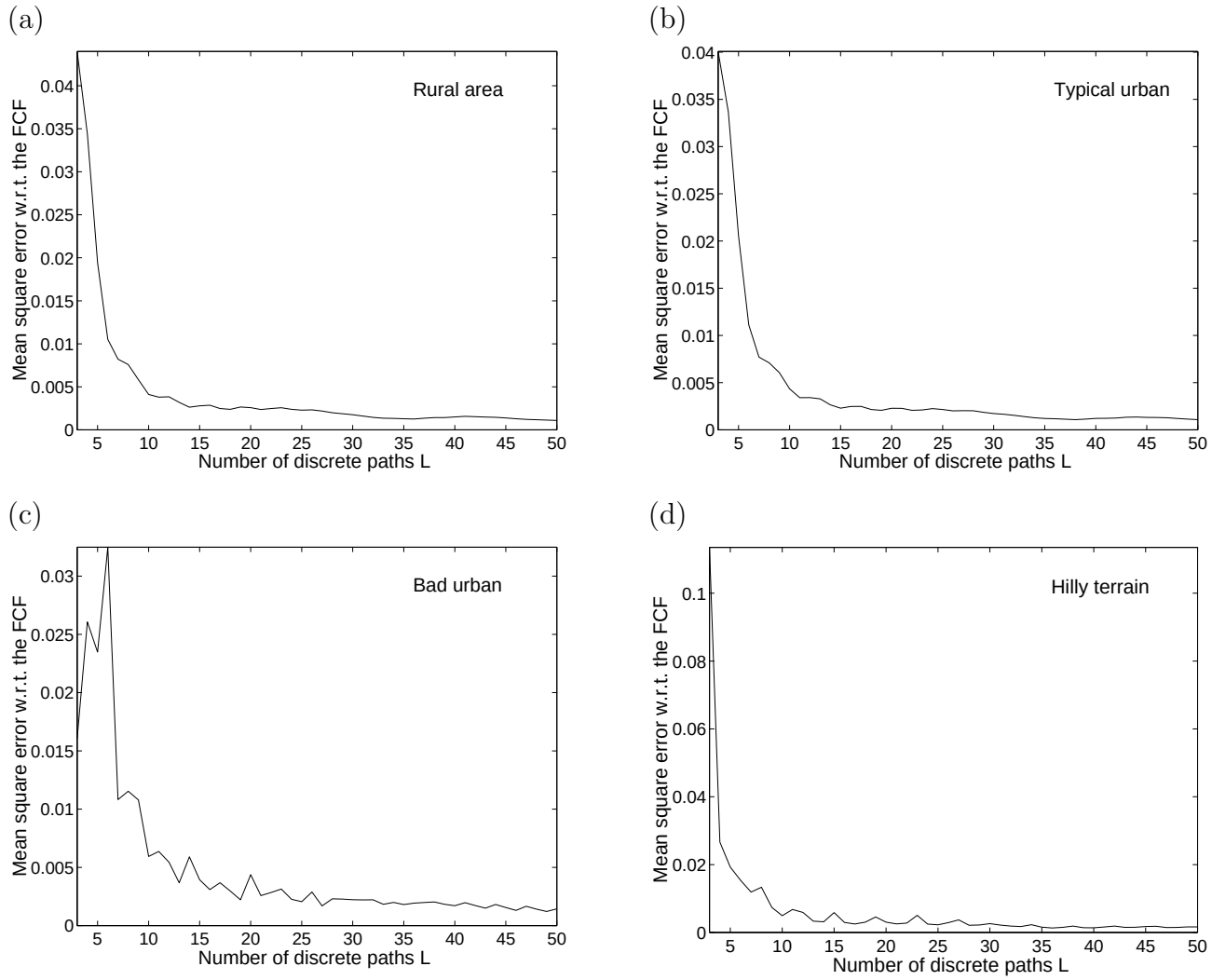

Fig. 3. Mean square error $E_{r_{\tau'\tau'}}$ with respect to the frequency correlation function as function of the number of discrete paths L for: (a) RA, (b) TU, (c) BU, and (d) HT channels by using the MEA.

```
(a)\\ \epsfxsize=6cm\epsffile{fig/fig3a.eps}
\end{minipage} \hfill
\begin{minipage}[t]{6cm}
(b)\\ \epsfxsize=6cm\epsffile{fig/fig3b.eps}
\end{minipage}\\[2ex]
\begin{minipage}[t]{6cm}
(c)\\ \epsfxsize=6cm\epsffile{fig/fig3c.eps}
\end{minipage} \hfill
\begin{minipage}[t]{6cm}
(d)\\ \epsfxsize=6cm\epsffile{fig/fig3d.eps}
\end{minipage} \\
\end{center}
\caption[Mean square error for the RA, TU, BU, and HT by using the MEA]{
\begin{bild} Mean square error $E_{r_{\tau'\tau'}}$ with respect to the
frequency correlation function as function of the number of discrete
paths $L$ for: (a) RA, (b) TU, (c) BU, and (d) HT channels by using
the MEA.
```

```
\end{bild}
} \label{fig3}
\end{figure}
```

C. MATLAB Figures

The figure below has been made by using MATLAB.

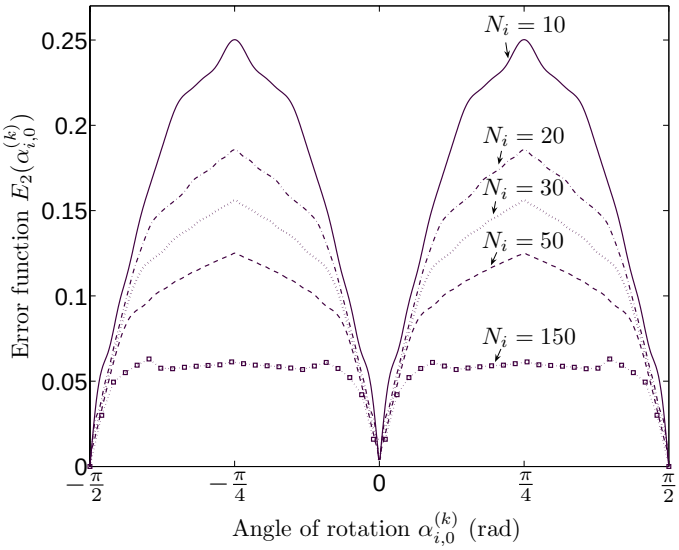

Fig. 4. The error function $E_2(\alpha_{i,0}^{(k)})$ in terms of the angle of rotation $\alpha_{i,0}^{(k)}$ for various values of N_i.

All the text in a figure should be written in the program-code. This is because it sometimes occurs a problem when opening a figure file (filename.fig), and hence it is very easy to re-plot the figure again. If you use a graphical interface to edit your plot, MATLAB can easily generate the m-code for you. The *fontsize* should be 30 pt and the *interpreter* must be *latex*. When the interpreter is latex, the *fontname* has no influence on the text style. The *linewidth* of the curves should be 1.5 pt, except for the dotted line which should have 2.5 pt. For journal and conference papers, the standard color of the graphs shown in the figure should be black. For presentations using a beamer, the following colors are recommended: red (reference), blue (simulation). MATLAB puts the *xlabel* and the *ylabel* too close to the figure, which must be changed manually by the user. In Fig. 1, the ticks on the x-label has been made by using different text boxes, since *Xtick* and *Ytick* do not interpret Latex character sequences. The final figure can be saved as an EPS-file, and further processed by Adobe Acrobat, which is used to change the boundary box around the figure. This can be done by choosing *Document*→ *Pages*→ *Crop* in Acrobat. Again, the figure must be saved as an EPS-file.

D. Tables

LaTeX-code:

```
\begin{table}[tb]
\begin{center}
\caption[Average delay and delay spread for
the four environments specified by COST 207]{
```

TABLE II
AVERAGE DELAY $D^{(1)}_{\tau'\tau'}$ AND DELAY SPREAD $D^{(2)}_{\tau'\tau'}$ OF THE FOUR ENVIRONMENTS SPECIFIED BY COST 207

Environment	Average delay $D^{(1)}_{\tau'\tau'}$ (μs)	Delay spread $D^{(2)}_{\tau'\tau'}$ (μs)
Rural area (RA)	0.1076	0.1050
Typical urban (TU)	0.9936	0.9774
Bad urban (BU)	2.6327	2.5268
Hilly terrain (HT)	4.3314	6.8822

```
\begin{tabelle} Average delay $D^{(1)}_{\tau' \tau'}$ and delay spread
$D^{(2)}_{\tau' \tau'}$ for the four environments specified by COST 207.
\end{tabelle}
} \label{tab2}
\renewcommand{\arraystretch}{1.3}
\begin{tabular}{|l||c|c|} \hline
 & Average delay & Delay spread \\
Environment & $D^{(1)}_{\tau' \tau'}$ & $D^{(2)}_{\tau' \tau'}$ \\
 & ($\mu s$) & ($\mu s$) \\ \hline \hline
Rural area (RA) & 0.1076 & 0.1050 \\ \hline
Typical urban (TU) & 0.9936 & 0.9774  \\ \hline
Bad urban (BU) & 2.6327 & 2.5268 \\ \hline
Hilly terrain (HT) & 4.3314 & 6.8822 \\ \hline
\end{tabular}
\renewcommand{\arraystretch}{1}
\end{center}
\end{table}
```

where the environment `tabelle` is defined analogously to the environment `bild`. (We have to substitute `\tablestring` and `\thetable` for `\figurestring` and `\thefigure`, respectively.) Thus,

```
\newenvironment{tabelle}{\setlength{\laenge}{\textwidth}
\settowidth{\tlaenge}{\tablestring~\thetable:\hspace{3.2ex}}
\addtolength{\laenge}{-\tlaenge}
\begin{minipage}[t]{\laenge}}{\end{minipage}}
```

E. References

Required style file: `bib.sty`. The references should be saved in a bibliography data bank, i.e., in a file with the extension `.bib`, e.g., `diplom.bib`. There are three main structures: book, article, and proceedings. Study carefully the differences between them.

```
@book{Pro95,
   author = "J.\ Proakis",
   title  = "Digital Communications",
   publisher = "New York: McGraw-Hill",
   edition="3rd",
   year = "1995",
}

@article{Pae98d,
   key = "Pae98",
   author = "M.\ P{\"a}tzold and U.\ Killat and F.\ Laue",
   title  = "An extended Suzuki model for land mobile satellite channels
             and its statistical properties",
   journal = IEEE_TVT,
   publisher = "",
   volume = "47",
   number = "2",
   pages = "617--630",
   month = may,
   year = "1998",
}

@inproceedings{Pae98e,
   key    = "Pae98",
   author = "M.\ P{\"a}tzold and F.\ Laue",
   title  = "Statistical properties of Jakes' fading channel simulator",
   booktitle = "Proc.\ IEEE 48th Veh.\ Technol.\ Conf., VTC '98",
   publisher = "Ottawa, Ontario, Canada",
   pages = "712--718",
   month = may,
   year = "1998",
}
```

where `IEEE_TVT` is defined as follows:

```
@string (IEEE_TVT = {IEEE Trans.\ Veh.\ Technol.})
```

The bibliography appears at the position where the following commands are placed (in the LaTeX file):

```
\bibliography{diplom}
\bibliographystyle{ieeeunsr}
```

Thereby, `diplom.bib` is the bibliography data bank and `ieeeunsr.bst` is the bibliography style file.

To make the bibliography, one has to run LaTeX, then BibTeX, and afterwards two times LaTeX.

Example:

Writing

```
\cite{Pro95,Pae98d,Pae98e}

\bibliography{diplom}
\bibliographystyle{ieeeunsr}
```

here leads to the following:

[1], [2], [3]

References

[1] J. Proakis, *Digital Communications*. New York: McGraw-Hill, 3rd Edition, 1995.

[2] M. Pätzold, U. Killat, and F. Laue, "An extended Suzuki model for land mobile satellite channels and its statistical properties," *IEEE Trans. Veh. Technol.*, vol. 47, no. 2, pp. 617–630, May 1998.

[3] M. Pätzold and F. Laue, "Statistical properties of Jakes' fading channel simulator," in *Proc. IEEE 48th Veh. Technol. Conf., VTC '98*, Ottawa, Ontario, Canada, May 1998, pp. 712–718.

F. Index

Required style file: `makeidx.sty`

To make index automatically, one has to write `\makeindex` in the header of the LaTeX file and `\printindex` at the position where the index should be printed (in general at the end of the file). The index is made by running LaTeX two times, then `makeindx.exe file` where `file.tex` is the LaTeX file. After that, one has naturally to run LaTeX once again. A style file for the index can also be used. If the style file has the name `index.sty`, then one has to use the command `makeindx.exe -s index.sty file`.

Example for an index style file:

```
headings_flag 1
heading_prefix "{\\bf  \\em "
heading_suffix "}\\nopagebreak "
item_1 "\n    \\subitem --- "
item_01 "\n    \\subitem --- "
item_x1 "\n    \\subitem --- "
item_2 "\n    \\subitem \\mbox{---~---} "
item_12 "\n    \\subitem \\mbox{---~---} "
item_x2 "\n    \\subitem \\mbox{---~---} "
```

G. Miscellaneous

- $f_{max} = 91\,\mathrm{Hz}$

LaTeX-code: `$f_{max}=91\,$Hz`

- $n = 1, 2, \ldots, N_i$

LaTeX-code: `$n=1,2,\ldots,N_i$`

- $\mathbb{R}, \mathbb{C}, \mathbb{N}, \mathbb{Z}$

LaTeX-code (`amsfonts.sty` required):
`$\mathbb{R}$, $\mathbb{C}$, $\mathbb{N}$, $\mathbb{Z}$`

- kth, ith, nth

LaTeX-code: `$k$th, $i$th, $n$th`