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Open Loop Motor Control using a PIC18F4520

*B. Eng. (Hons.) Sustainable Design Engineering*

*Abstract*—These instructions give you guidelines for preparing papers for conferences or journals*.* Use this document as a template if you are using Microsoft Word. Otherwise, use this document as an instruction set. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract; it sets the footnote at the bottom of this column. Page margins are 1,78 cm top and down; 1,65 cm left and right. Each column width is 8,89 cm and the separation between the columns is 0,51 cm.

*Keywords*—About four key words or phrases in alphabetical order, separated by commas.

# INTRODUCTION

THIS document is a template for *Word (doc)* versions. If you are reading a paper version of this document, so you can use it to prepare your manuscript.

When you open **template.doc**, select “Page Layout” from the “View” menu in the menu bar (View | Page Layout), which allows you to see the footnotes. Then type over sections of **template.doc** or cut and paste from another document and then use markup styles. The pull-down style menu is at the left of the Formatting Toolbar at the top of your *Word* window (for example, the style at this point in the document is “Text”). Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. **Do not change the font sizes or line spacing to squeeze more text into a limited number of pages. *Use italics for emphasis; do not underline.***

To insert images in *Word,* position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with “Float over text” unchecked).

# Procedure for Paper Submission

## Submission

Please submit your manuscript electronically and in hardcopy for review. When you submit your initial full paper version, prepare it in two-column format, including figures and tables. A link on Moodle is available for uploads.

## Figures

All tables and figures in the document should include captions and be referred to in the text prior to the table or figure.

# MATHS

If you are using *Word,* use either the Microsoft Equation Editor or the *MathType* add-on (http://www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). “Float over text” should *not* be selected.

# Units

Use SI as primary units. (SI units are mandatory.) English units may be used as secondary units (in parentheses). **This applies to papers in data storage.** For example, write “15 Gb/cm2 (100 Gb/in2).” An exception is when English units are used as identifiers in trade, such as “3½ in disk drive.” Avoid combining SI and imperial units. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

# Helpful Hints

## Figures and Tables

Large figures and tables may span both columns. Place figure captions below the figures; place table titles above the tables. If your figure has two parts, include the labels “(a)” and “(b)” as part of the artwork. Please verify that the figures and tables you mention in the text actually exist. **Please do not include captions as part of the figures. Do not put captions in “text boxes” linked to the figures. Do not put borders around the outside of your figures.** Use the abbreviation “Fig.” even at the beginning of a sentence. Do not abbreviate “Table.”.

**The paper is only printed in black-white color.** Figure axis labels are often a source of confusion. Use words rather than symbols. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K),” not “Temperature/K.”

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Fig. 3 Performance analysis comparing measured data with predicted data.

## References

Use Harvard style referencing (Boyle, 2004). The sentence punctuation follows the brackets (Glauert, 1926). Multiple references (Glauert, 1926), (Sahin, 2004). When citing a section in a book, please give the relevant page numbers. “Ref. (Dundalk Institute of Technology, 2009)” or “reference (Dundalk Institute of Technology, 2009)” except at the beginning of a sentence: “Reference (Dundalk Institute of Technology, 2009) shows ....”

Please note that the references at the end of this document are in the preferred referencing style. Give all authors’ names; do not use “*et al*.” unless there are six authors or more. Use a space after authors' initials. Papers that have not been published should be cited as “unpublished”. Papers that have been submitted for publication should be cited as “submitted for publication”. Papers that have been accepted for publication, but not yet specified for an issue should be cited as “to be published”. Please give affiliations and addresses for private communications.

TABLE 1. Units for Magnetic Properties

|  |  |  |
| --- | --- | --- |
| Symbol | Quantity | Conversion from Gaussian and  CGS EMU to SI |
| Φ | magnetic flux | 1 Mx → 10−8 Wb = 10−8 V·s |
| *B* | magnetic flux density,  magnetic induction | 1 G → 10−4 T = 10−4 Wb/m2 |
| *H* | magnetic field strength | 1 Oe → 103/(4π) A/m |
| *m* | magnetic moment | 1 erg/G = 1 emu  → 10−3 A·m2 = 10−3 J/T |
| *M* | magnetization | 1 erg/(G·cm3) = 1 emu/cm3  → 103 A/m |
| 4π*M* | magnetization | 1 G → 103/(4π) A/m |
| σ | specific magnetization | 1 erg/(G·g) = 1 emu/g → 1 A·m2/kg |
| *j* | magnetic dipole  moment | 1 erg/G = 1 emu  → 4π × 10−10 Wb·m |
| *J* | magnetic polarization | 1 erg/(G·cm3) = 1 emu/cm3  → 4π × 10−4 T |
| χ*,* κ | susceptibility | 1 → 4π |
| χρ | mass susceptibility | 1 cm3/g → 4π × 10−3 m3/kg |
| μ | permeability | 1 → 4π × 10−7 H/m  = 4π × 10−7 Wb/(A·m) |
| μr | relative permeability | μ → μr |
| *w, W* | energy density | 1 erg/cm3 → 10−1 J/m3 |
| *N, D* | demagnetizing factor | 1 → 1/(4π) |

No vertical lines in table. Statements that serve as captions for the entire table do not need footnote letters.

Capitalize only the first word in a paper title, except for proper nouns and element symbols.

## Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write “C.N.R.S.,” not “C. N. R. S.” Do not use abbreviations in the title unless they are unavoidable.

## Equations

Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). First use the equation editor to create the equation. Then select the “Equation” markup style. Press the tab key and write the equation number in parentheses. To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

(1)

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but T is the unit tesla). Refer to “(1),” not “Eq. (1)” or “equation (1),” except at the beginning of a sentence: “Equation (1) is ... .”

## Other Recommendations

Use one space after full stops and colons. Hyphenate complex modifiers: “tidal-current-energy resource.” Avoid dangling participles, such as, “Using (1), the potential was calculated.” [It is not clear who or what used (1).] Write instead, “The potential was calculated by using (1),” or “Using (1), we calculated the potential.”

Use a zero before decimal points: “0.25,” not “.25.” Indicate sample dimensions as “0.1 m × 0.2 m,” not “0.1 × 0.2 m2.” The abbreviation for “seconds” is “s,” not “sec.” When expressing a range of values, write “7 to 9” or “7-9,” not “7~9.”

# Some Common Mistakes

The word “data” is plural, not singular. Use the word “micrometer” instead of “micron.” 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). Do not use the word “essentially” to mean “approximately” or “effectively.”

Be aware of the different meanings of the homophones “affect” (usually a verb) and “effect” (usually a noun), “complement” and “compliment,” “discreet” and “discrete,” “principal” (e.g., “principal investigator”) and “principle” (e.g., “principle of measurement”). 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 full stop after the “et” in the Latin abbreviation “*et al.*”. The abbreviation “i.e.,” means “that is,” and the abbreviation “e.g.,” means “for example” (these abbreviations are not italicized).

# Conclusion

A conclusion section is required. 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.

Appendix

Appendices, if needed, appear before the acknowledgment.

Acknowledgment

Acknowledge any person/s that assisted with your work.

References

BOYLE, G. (2004) *Renewable Energy Power for a Sustainable Future*, Oxford University Press.

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(Maximum of 4 Pages)