# Exercise 3: Data Processing

Matthew Chandler

## Abstract [Heading 2]

Several experimental data sets are examined and processed using MATLAB v9.9.0. The frequency-dependent attenuation of a Perspex block was measured as a monotonously increasing function; the frequency-dependent reflection coefficient of an adhesive joint connecting two aluminium plates in immersion was measured; and an automated thickness measurement of a steel bearing casing was developed, finding the thickness to be **---mm** at **---mm**.

## Introduction [Heading 2]

The report required for this course must be submitted as a PDF file in precisely the format described in this document. Strict formatting and "house styles" are common requirements when writing internal company reports, as well as when writing academic papers for journals and conference proceedings.

### The template and paragraph styles [Heading 3]

This example document is written in Word 2007 and contains all the necessary styles, the names of which are in square brackets and highlighted in red. Paragraphs in the body of the document should be in the [Normal] style. You are recommended to use this document as the starting point for each report. If you wish to use an alternative word processing package, the final result must still be a single PDF file in the same format (i.e. with the same font, margins, page limits etc.).

If, as recommended, you are using this document as a template then you should use the paragraph styles that have been defined, which will ensure that the spacing, font, format etc. is correct. To select the style for a paragraph, make sure that the cursor is somewhere in the paragraph and either use the buttons in the toolbar or the shortcut keys that are listed below.

#### Titles [Heading 4]

Start the description of each exercise with the title of the exercise in the [Heading 1] style, which will force it to start on a new page. On the front page of the whole report, the text on the next line after the title should be your name in the [Author] paragraph style. Within the description of each exercise, you should use subheadings (styles [Heading 2], [Heading 3] and [Heading 4]) as necessary.

#### Page setup

The page size is A4 and the margins are 20 mm all around.

#### Shortcut keys and brief description of main styles

Alt+1 [Main title] (bold Arial 16 point, page break before)

Alt+2 [Sub-heading] (bold Arial 10 point, small caps)

Alt+3 [Sub-sub-heading] (bold italic Arial 10 point)

Alt+4 [Sub-sub-sub-heading] (italic Arial 10 point)

Alt+N [Normal paragraph text] (Arial 10 point, 5pt gap before and after)

Alt+E [Equation] (25.4 mm indent, right justified tab at 170 mm for numbering)

Alt+F [Figure] (centred, locked to following paragraph)

Alt+R [Reference] (Arial 8 point, 12.7 mm hanging indent, with tab stop at 12.7 mm)

### Using other people's material

If you use material from anywhere else, you must reference the source. List the references at the end of each report under the subheading "References" in a numbered list (the style for each item in the list is [Reference]) and cite each reference at the appropriate point in the text by placing the relevant reference number in square brackets, like this [1]. The first citations to each reference in the text should be in numerical order (change the order of the reference list if necessary so that this is achieved). All references in the list must be cited explicitly in the text. Here is an example of a citation to a journal paper [2] that describes some interesting work. You can also find material in conference proceedings [3] or websites [4]. Use the examples in the list to determine the exact way in which references to different types of source should be formatted. The most important requirement is that the reference must provide enough information to allow someone else to retrieve the same information.

### Page limits

The maximum number of pages (excluding the appendices containing Matlab code) for the exercises are as follows:

Exercise 3: 6 pages

Exercise 5: 10 pages

Each one should be submitted as a single PDF document.

### Grammar

Only capitalise (a) the first word of sentences, (b) proper nouns, even in titles and (c) the first letters of words that are used to define an acronym, for example "ultrasound is widely used in Non-Destructive Testing (NDT)". Define all acronyms the first time they are used. It is preferable in technical reports to write in the third person using the passive voice. This means for example writing "the fields from transducers were investigated" rather than "we investigated the fields from transducers".

## Equations, figures and references

### Equations

The paragraph style for equations is [Equation]. This indents the equation and provides a right justified tab at the right-hand margin where you can insert a number. For example, here is a famous equation:

(1)

Remember to define all terms in equations!

### Figures

The paragraph style for figures is [Figure]. The figure placement should be "in line with text". The [Figure] style centres the figure and puts a box around it. Do not wrap text around figures. Label sub-figures with (a), (b) etc. as in the example below. The style of the paragraph immediately after the figure should be [FigureCaption]. Identify the figures in each report as Fig. 1, Fig. 2 etc. and press tab after the number before typing the caption. The [FigureCaption] style provides a hanging indent so that the caption text is properly aligned after the number. All figures must be referenced in order in the main text, e.g. "Fig. 1(a) shows an image …"

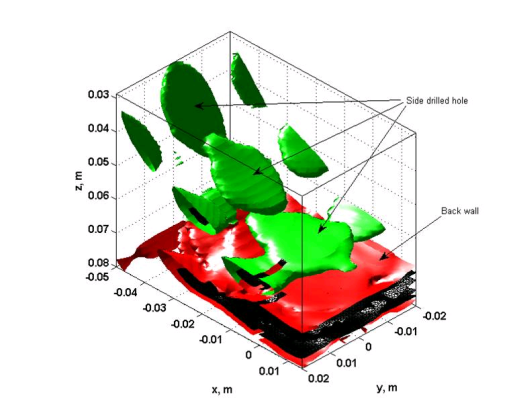
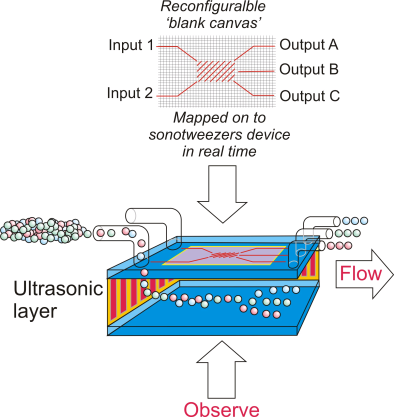
(a)  (b) 

Fig. 1 Some pictures of (a) 2D array image of holes in a test sample and (b) a particle manipulation device. If the caption runs onto multiple lines, they will be aligned like this.

## References

In the example reference list below, the style for each entry is [Reference]. Type the reference number, a period and then press tab before entering the details of the reference itself.

1. Wilcox, P. D., "Research things", *Nature*, **12**(3), pp. 145-155, 2001. {example of a reference to a journal paper}

2. Holmes, C., Drinkwater, B. W. and Wilcox, P. D., "Post-processing of the full matrix of ultrasonic transmit receive array data for non-destructive evaluation”, *NDT & E Int.*, **38**(8), pp 701-711, 2005. {another example of a reference to a journal paper}

3. Monkhouse, R. S. C., Wilcox, P. D. and Cawley, P., “Flexible Interdigital PVDF Lamb Wave Transducers for the Development of Smart Structures” in *Annual Review of Progress in QNDE*, eds. Chimenti, D. E., Thompson, D. O., **16**(A), pp. 877-884, Plenum Press, New York, 1997. {example of a reference to a conference paper}

4. University of Bristol, "Useful information and resources", http://www.bris.ac.uk/currentstudents/, accessed 27 January 2010. {example of a reference to a website}

# Exercise 3: Data Processing

## Abstract

The propagation of a pulse is simulated by applying phase delays to its spectrum in the frequency domain. Etc. Etc. Etc.