

Report Guide: G) Field spesific instructions

TAMK: STAFF AND STUDENT

TEKSTIKENTTÄ

This section provides a compilation of any field spesific instructions that should be followed in writing. Content will be completed.

Technology: Glossary

If there are only a few abbreviations and terms, they are explained when they first occur in the text. The explanation is given in brackets. If it is necessary to use a separate list of symbols, it is placed on the page following the table of contents, before the introduction. The title is not given in the table of contents, but the introduction is the first chapter.

GLOSSARY

A	double-acting cylinder area, m ²
a	restrictor area, m ²
d	slide or restrictor diameter, m
f	frequency, Hz
$G(s)$	transfer function
M_{max}	maximum hydraulic motor torque, Nm
m	load or piston mass, kg
P	wattage, W
p	pressure, MPa
α	load factor
v	amplitude or maximum value

The list of symbols above is an example on a concise way of explaining used abbreviations and special vocabulary. The list heading can be, for example, GLOSSARY as above or ABBREVIATIONS AND TERMS. The list is only constructed if such abbreviations, terms, or other vocabulary is used that a professional in the field, such as your supervisor, would not necessarily understand. In any case, the abbreviations have to be written in full words and, if necessary, explained in the actual text. Generally, known field-related concepts do not need to be explained or listed. The abbreviations are given in alphabetical order as follows: mathematical symbols, other symbols, and letter symbols.

Technology: Graphs, equations and formulas

Graphs

Graphs are called figures. They present individual measurement results or other equivalent information and must have axis quantities and units. Either the name or abbreviation of the quantity is given. Quantities are italicised as in text and the potential unit is given in brackets. The measurement points are marked clearly and potential functions which describe the phenomenon are fitted with the points. It is worth avoiding use of fraction bars or splines between points unless it is necessary for readability (Figure 5).

The background grid is drawn if necessary. If the purpose is to read data from the graph, the grid has to be drawn (Figure 5). Even if the grid was not drawn, the graph axes should have the scale marks (Figure 6). The axis figures should have equal number of decimals except for integer numbers. The axis pitch should mainly be 1, 2, 5 or 10 units.

If necessary, axis markings are moved in such a way that the markings do not leave underneath the points or fits. If several graphs are drawn in the same figure, an explanation box is added.

As a rule, the same font is used in the graph as in the body text but readability is the most important factor. The physical graph types include XY scatter charts. Figures 4, 5 and 6 include different types of graphs. There are a variety of graphs and field-specific ways of representing them and thus in unclear cases you should consult your thesis supervisor. The examples aim at illustrating the general principles on presenting graphs.

Figure 4 presents the linear dependency between tension and current power. A straight line was fitted to the measurement points and vertical error bars were drawn on the points. There is a grid on the background and the more detailed pitches are marked on the axes with scale marks. The quantity symbols are italicised, but units are written in regular font.

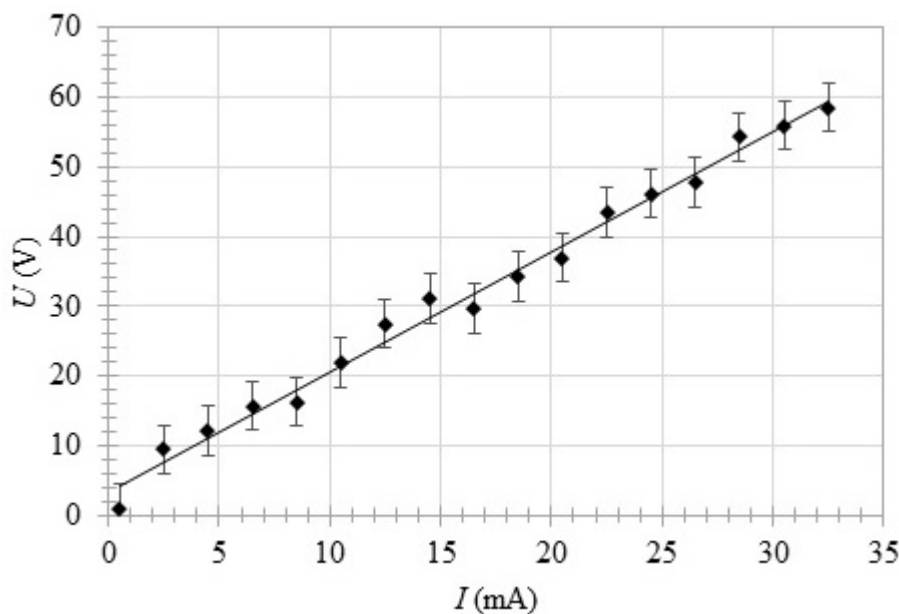


FIGURE 4. Dependence between tension U and current power I .

Figure 5 represents the values measured by an acceleration sensor at various points of time. In addition to the measurement points, a solid line was also drawn to improve readability as it is difficult to conceive the measured phenomenon based on points only. The line is slightly

transparent. If there are more points, they do not have to be drawn and the measurement can be presented as a solid line only. A detailed grid is in the background as the purpose is to see the accurate values from the graph. The axis font has been slightly bolded.

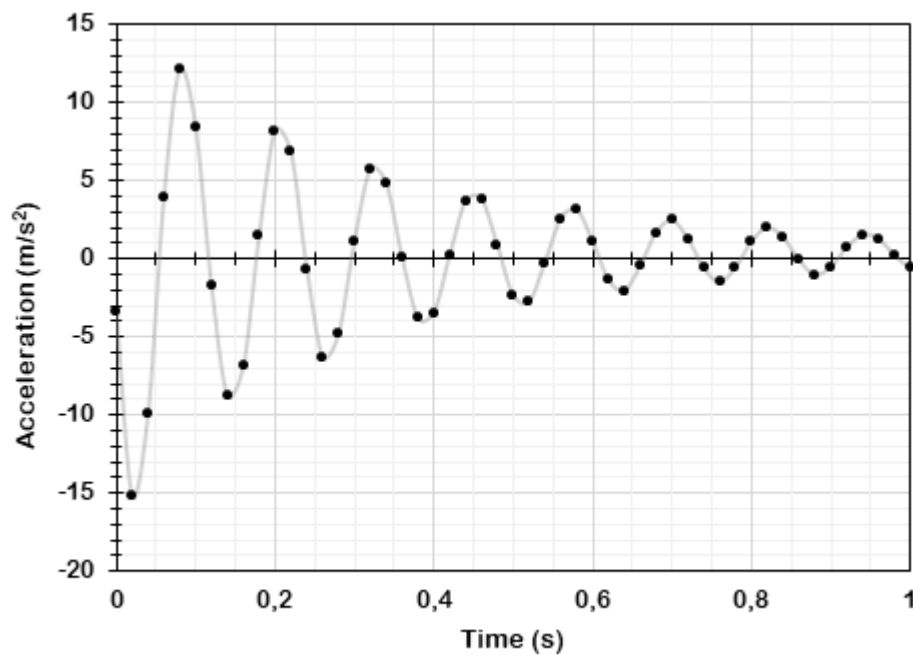


FIGURE 5. Weakening of vibration as a function of time.

Figure 6 offers an example of presenting the measurement points without a grid. The purpose of the graph is to demonstrate that the sensor-measured signal is cyclic. A cyclic function was fitted to the measurement points and the horizontal axis markings were moved to the bottom of the graph for the sake of clarity. A line was drawn to emphasise the actual place of the axis.

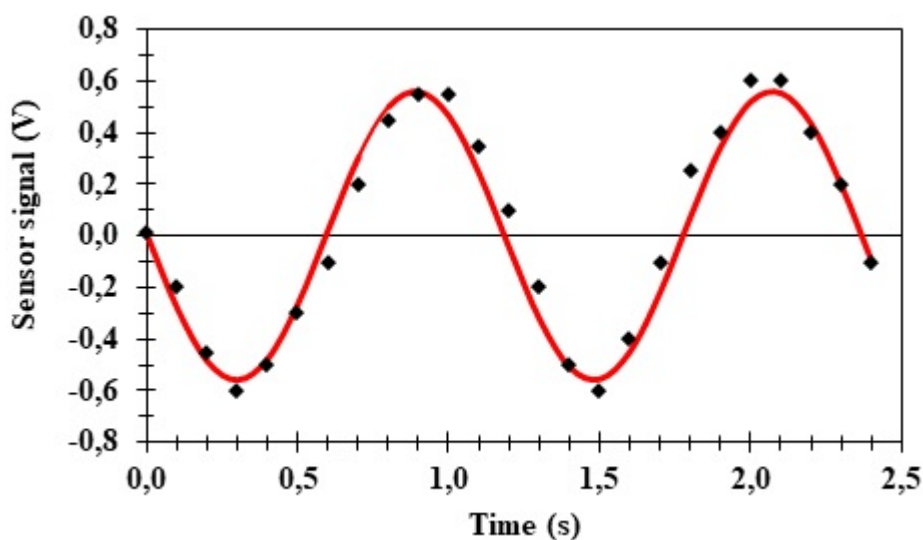


FIGURE 6. Periodicity of sensor tension signal.

Equations and formulas

Equations and formulas are written on their own line and one blank line is left above and below them. They are centred. If more than one line is needed for the formula, it is divided either before the equality sign (=) or after some other mathematical operator (+, -, /, ·).

Equations are numbered consecutively in brackets on the right side of the equation close to the text margin. The numbering is set in the middle point of the formula if the formula has a rational expression or for some other reason it does not fit in one row. The number can be used to refer to the equation or formula in the text, and the referred equations are not mixed up: "...according to the equation (1)..." Formulas are not numbered when numerical values are substituted into them unless there is need for referring to the substitution in the text.

The quantity symbols of equations are explained right below the equation in the text. If necessary, quantities can also be explained just before the formula provided that their meaning becomes clear for the reader. The formula is a part of the sentence and thus an appropriate punctuation mark is written after it. If there is a risk of confusing the punctuation mark with another marking, it is worth leaving it out (Formula 3). For example, with direct current the electric power P is

$$P = UI, \quad (1)$$

in which U is voltage and I is current.

In equations, the same letter can sometimes express both the quantity and unit of measurement. As above, variables and quantities are italicised, but value units are written in regular font. There is a space between the number and unit.

Example:

Based on measurements the electric power can be calculated with the formula (1)

$$P = 22,5 \text{ V} \cdot 0,20 \text{ A} = 4,5 \text{ W}.$$

Trigonometric function abbreviations (e.g. sin and cos) are also written in regular font. For example, electric power for alternating current is written:

$$P = UI \cos \phi, \quad (2)$$

in which $\cos \phi$ is power ratio. Function arguments are marked in brackets if it does not otherwise become clear which part belongs to the argument.

Indexes and exponents that are not variables are also written in regular font. For example, the electric field strength caused by point charge Q with the distance r is:

$$E = \frac{1}{4\pi\epsilon_r\epsilon_0} \cdot \frac{Q}{r^2} \quad (3)$$

Subindexes are, however, italicised if they represent a physical quantity, for example specific heat capacity at constant pressure is marked c_p . Variable indexes are also italicised. For example,

$$\sum_{i=1}^{\infty} \sum_{j=1}^{\infty} x_i y_j = x_1 y_1 + x_2 y_2 + \dots \quad (4)$$

Chemical formulas and chemical element symbols are written in regular font, for example H₂O or ¹⁴C. It is worth moving subscripts and superscripts higher or lower as necessary and their character pitch can be compressed. For example, sulphate ion is marked SO₄²⁻ in which the subscript and superscript are written on top of each other.

Differential and derivative operators are written in regular font even if related quantities are italicised:

$$a = \frac{dv}{dt} \quad (5)$$

$$U_{AB} = V_A - V_B = \int_A^B \vec{E} \cdot d\vec{s}. \quad (6)$$

Technology: Standards and directives

When referring to standards and EU legislation, an equivalent model to that used in referring to laws and regulations is followed.

Reference in text:

(SFS 5989 2012, 15)

List of references:

SFS 5989. 2012. Lähde- ja tekstiviitteitä koskevat ohjeet. Helsinki: Suomen Standardoimisliitto SFS. Read on 3.4.2017. Requires access right. <https://online.sfs.fi/fi/index.html.stx>

Reference in text:

(Directive 2012/27/EU)

List of references:

Directive 2012/27/EU. Directive of the European Parliament and of the Council on Energy Efficiency. Official Journal of the European Union 14.11.2012. Read on 3.4.2017. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:315:0001:0056:FI:PDF>