

Faculty of Engineering and Applied Science

ADDING EQUATIONS TO DOCUMENTS

In technical reports that contain various mathematical or scientific calculations, the insertion of equations may be necessary. The rules for adding these equations to a text are much different from what is required for tables or figures.

This document covers the best practices for properly incorporating equations in your document.

INCLUSION IN TEXT

Equations that do not require more vertical space than a normal line of body text can be included within the sentence using italics.

The radius of rotation was calculated using $F_c = mv^2/r$. Using the value obtained for r, we were able to calculate the acceleration of the system, using $a_c = v^2/r$.

If an equation needs more vertical space than a normal line of text, the equation should be offset.

Total resistance for the system was obtained using

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots$$

NUMBERING EQUATIONS

Equations that will be referred to multiple times in a text should be numbered. They are numbered in much the same way as tables or figures are. There are two numbering options: sequentially or according to section number. If the document has only a few equations, you can number them starting with 1. If there are more than a few, they can be done by section number. For example, equation 2.3 would be the third equation in section 2. When numbering the equations, it is important to be consistent. Below you can see three ways to number equations in the text.

$$\sin \alpha \pm \sin \beta = 2 \sin \frac{1}{2} (\alpha \pm \beta) \cos \frac{1}{2} (\alpha \mp \beta)$$
(Equation 1)

$$OR$$

$$E = \frac{1}{2} \rho g A h^2$$
Eq. 1

$$OR$$

$$r = \frac{1}{2} a t^2 + v_0 t + r_0$$
(1)

REFRRING TO EQUATIONS

While tables and figures are sometimes mistakenly included in a document with no specific reference being made to them, this mistake is much less likely to be made with equations. Use the same method used to number the equations to refer to them in the text.

- "The relationship between A and B, as given by Equation 1, indicates that ..."
- "Using Eq. 1, it can be seen that..."
- "Using (1), we find that ..."

GIVING INFORMATION ON VARIABLES

In some cases, additional explanations might be required for the variables. If this happens, the explanation is usually given below the equation, as shown below:

The coefficient of fluid drag (C_d) is given by

$$C_d = \frac{F_d}{\frac{1}{2}\rho v^2 A_p}$$

Equation 1

where F_d is the drag force, ρ is the fluid density, v is the velocity of the object relative to the fluid, and A_p is the area that the force acts upon.

FORMATTING EQUATIONS

When inserting the equation, try to separate it by the height of one line of body text on the top and bottom. Also, ensure that the equations are properly aligned. The information below is from Writing for Science and Engineering: Papers, Presentations and Reports, 2nd Ed¹.

For a sequence of equations in which the left-hand side is unchanged.

Align the = symbol in each line.

$$u(x) = -\frac{q_0}{AE} \int_0^x (x-\xi) d\xi + \frac{C_1 x}{AE}$$
$$= -\frac{q_0 x^2}{2AE} + \frac{C_1 x}{AE}$$

For continued expressions in which the left side is long. Align the = symbol with the first operator in the first line.

$$[(a_1 + ia_2) + (a_{11}s_1 + a_{21}s_2)]/[(b_1 + ib_2) + (b_{11}s_1 + b_{21}s_2)] = f(x)g(y) + \dots$$

For expressions in which the right-hand side is long: Align the continuing operator with the first term to the right of the = symbol.

$$V(x) = -P\langle x \rangle^0 + P(x-a)^0 + P\langle x - (L-a) \rangle^0 - P\langle x - L \rangle^0 + C$$

Built-up fractions should be avoided in text. Instead, use solidus fractions 1/(x + y).

¹ H. Silyn-Roberts. Writing for Science and Engineering: Papers, Presentations and Reports, 2nd ed. Netherlands: Elsevier, 2013, p. 196.

ADDING EQUATIONS INTO WORD

Either of the methods listed below can be used to add equations to your document.

- > You can use the Equation function in Word, found under the Insert tab.
- If you use Windows, you can use the <u>Math Input Panel</u>, found under Accessories in the start menu, or within the <u>Ink Equation feature</u>, depending on the version of Word you are using.