Module: Electrotechnique Fondamentale 1

TD N°1: Complex Numbers (CN)

Exercice 1

Consider the complex number z with modulus r, argument θ and complex conjugate $\overline{z}$

   A. Calculate the inverse of z for $z = 2 + j5$

   B. What is the solution to $2z + \overline{z} = 6 + j2$

   C. Put the following complex numbers in algebraic form :

$$z_1 = \frac{1-j2}{3+j} \quad ; \quad z_2 = \frac{(3+j5)^2}{1-j2} \quad ; \quad z_3 = \left(\frac{1+j}{2-j}\right)^2 + \frac{3+j6}{3-j4}$$

Exercice 2

Deduce the module and the argument of the following complex numbers and then put in trigonometric form:

$$z_1 = 1 + \sqrt{3}j \; ; \quad z_1 = \sqrt{3} + j \; ; \quad z_1 + \quad z_2 \; ; \quad z_1{}^{27}$$

Exercice 3

Use Euler's formulas to transform the following expression into a sum

$$f(x) = sin(2x).sin(x)$$

Linearize :

$$F(x) = sin^2(x) \; ;$$

$$g(x) = sin^3(2x).$$

Exercice 4

A dipole carries a current $i(t) = 2\sqrt{2}sin(314t + 6\pi)$ when subjected to voltage

$$u(t) = 220\,sin(314t)$$

- Determine the impedance of this dipole.