

PERSONAL DATA ENCRYPTION USING COMPLEX ANALYSIS

Charles Ndung'u

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1 Introduction

Brief introduction to Complex Analysis. We shall begin by defining a complex number; A complex number contains two parts real and imaginary part example

$$Z=x+iy$$

here the complex variable Z has two parts x as the real part and iy as the imaginary part.

Example suppose we wish to use the following function as the algorithm of our cipher?

$w = \frac{1}{1-z}$ where by the knowledge of complex analysis we recall that w is $=$ to $u + iv$ then we can say that:

$u + iv = \frac{1}{1-z}$ where z is $= x + iy$ thus we can solve the function w as :

$w = \frac{1}{1-(x+iy)}$ which is simplified as :

$u + iv = \frac{1}{1-(x+iy)}$ we note that in the Right Hand Side we shall have the denominator with real numbers and imaginary numbers as follows:

$1 - x$ as the real part and $-iy$ as the imaginary part. this will lead to the following.

$u + iv = \frac{1}{(1-x)-iy}$ making the denominator real by multiplying with the complex conjugate that is $(1-x) + iy$

$u + iv = \frac{1}{(1-x)-iy} * \frac{(1-x)+iy}{(1-x)+iy}$ which becomes

$u + iv = \frac{(1-x)+iy}{(1-x)^2+y^2}$ this makes us draw the following conclusions:

the real part U is :

$$U = \frac{1-x}{(1-x)^2+y^2} \text{ and the imaginary part as } iV = \frac{iy}{(1-x)^2+y^2}$$