

217(1) : Representation of the processing Ellipse

In polar representation:

$$r = \frac{d}{1 + e \cos(x\theta)} \quad - (1)$$

$$d = a(1 - e^2) \quad - (2)$$

and

$$e < 1. \quad - (3)$$

In Cartesian representation:

$$\frac{(X + ae)^2}{a^2} + \frac{y^2}{b^2} = 1 \quad - (4)$$

where

$$X = ae + r \cos(x\theta) \quad - (5)$$

$$y = r \sin \theta \quad - (6)$$

$$r = a - eX \quad - (7)$$

So:

$$X = ae + \frac{d \cos(x\theta)}{1 + e \cos(x\theta)} \quad - (8)$$

$$y = \frac{d \sin(x\theta)}{1 + e \cos(x\theta)} \quad - (9)$$

The processing code is given by:

$$e = 0 \quad - (10)$$

so

$$X = d \cos(x\theta) \quad - (11)$$

$$y = d \sin(x\theta) \quad - (12)$$

2) Suggested Plots

1) Plot X versus θ from eq. (8), i.e.

$$X = \frac{d\epsilon}{1-\epsilon^2} + \frac{d \cos(x\theta)}{1+\epsilon \cos(x\theta)} \quad - (13)$$

$$X = d \left[\frac{\epsilon}{1-\epsilon^2} + \frac{\cos(x\theta)}{1+\epsilon \cos(x\theta)} \right] \quad - (14)$$

for various x and ϵ .

2) Plot Y versus θ from eq. (9).

3) Plot X versus θ from eq. (11)

4) Plot Y versus θ from eq. (12)
