

Flower generation report

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March 2024

1 Creating a Petal

The structure of a petal can be simplify into two main parts :

- an axis of symmetry
- the external shape

Hence, to initialize the position of the petal we begin by determining the position of the central segment. This segment will be used to build the shape, as the axis of symmetry. A segment is then defined by two point, as shown in the schema below.

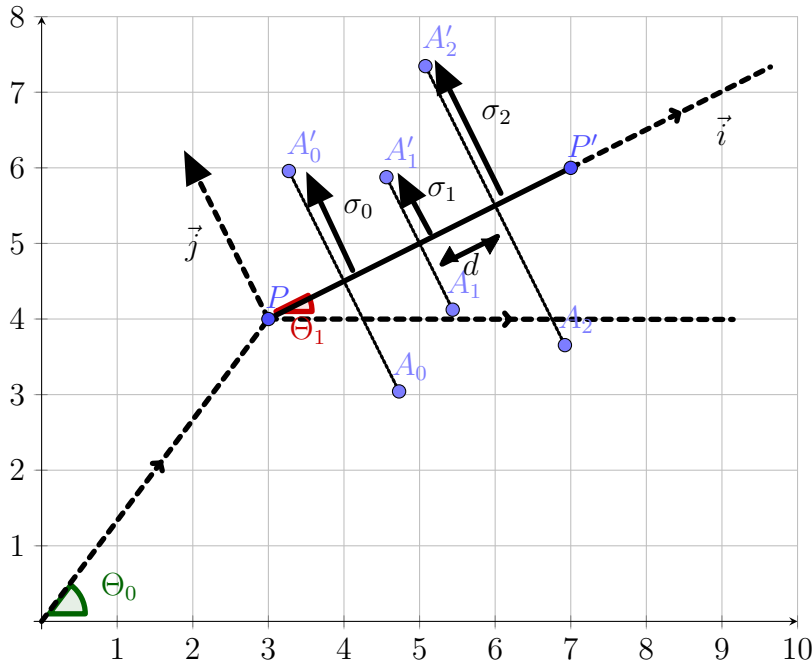


Figure 1: Petal schema

One notices that the family of point A_n will represent the external shape of the petal. d is the length of one of the $n - 2$ subdivision of the $[PP']$ segment. The smaller d is, the more precise the curve representing the external shape will be. Θ_1 is known as the coordinates of P and P' are considered given data. For a point A_n we can determine its coordinate by noticing that :

$$O\vec{A}_n = O\vec{P} + d * (n + 1) * \vec{i} + \sigma_n * \vec{j}$$

Giving, when computing the projection on the x and y axis :

$$x(A_n) = x(P) + d * (n + 1) * \cos(\Theta_1) - \sigma_n * \sin(\sigma_1)$$

$$y(A_n) = y(P) - d * (n + 1) * \sin(\Theta_1) - \sigma_n * \cos(\sigma_1)$$

We can get A'_n by symmetry over $[PP']$. Aside from σ_n all the parameters are known : it is the only one chosen according to a function curve in order to give the petal the wanted shape.

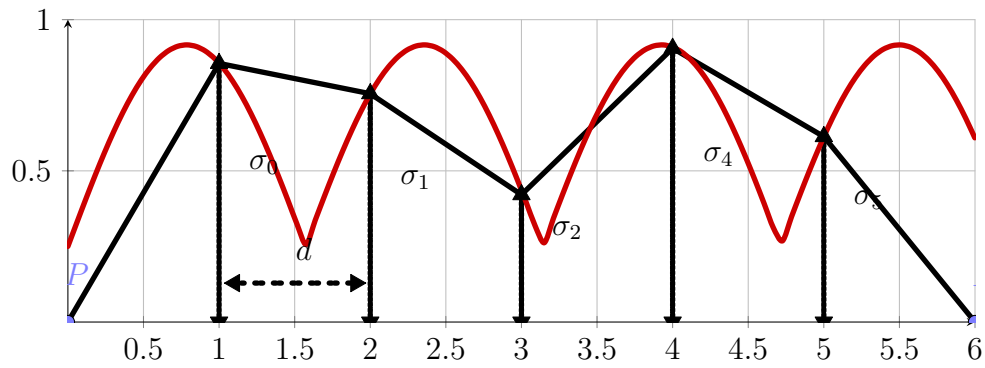


Figure 2: Determining σ_n

As you can see above, if we call f the function corresponding to the red curve, then we have :

$$\sigma_n = f(d * (n + 1))$$

The line between the point can be obtained by interpolation (linear, quadratic, etc...). It then becomes quite easy to change the shape of the petal, as it could be defined like a couple of :

- a curve shaping function
- an interpolation function