Generating a Gaussian function

Sometimes it is necessary to generate

$$y = \mathrm{e}^{-t^2}$$

by means of an analog computer. To implement this, a differential equation having this function as a solution is required. The first derivative of y with respect to t is

$$\dot{y} = -2t\mathrm{e}^{-t^2} = -2ty,$$

yielding a 1st order differential equation which can be directly implemented on an analog computer as shown in figure 1. The parameter α is set experimentally and should be rather small, about 0.01. Figure 2 shows a typical output signal obtained on THE ANALOG THING as shown in figure 3.

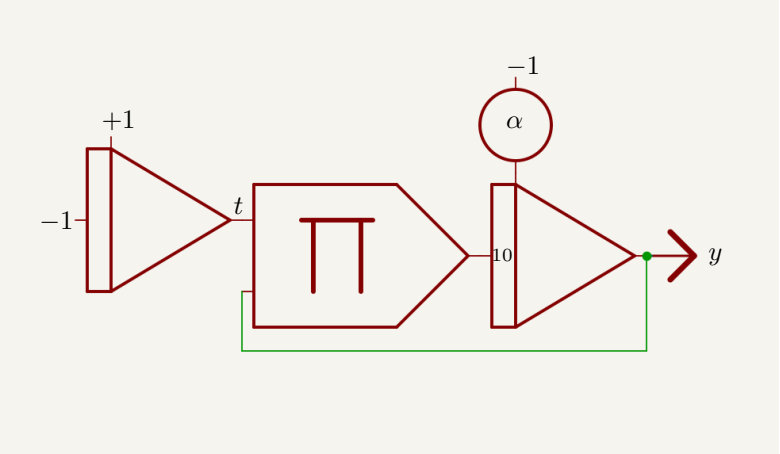

Figure 1: Analog computer setup for generating a Gaussian function

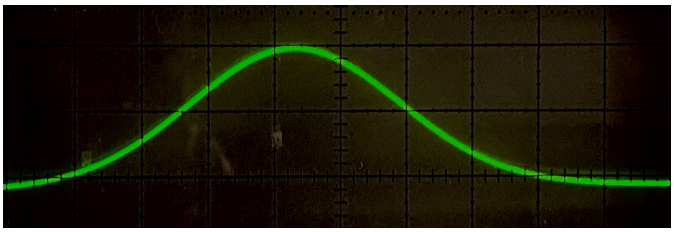

Figure 2: Typical Gaussian function

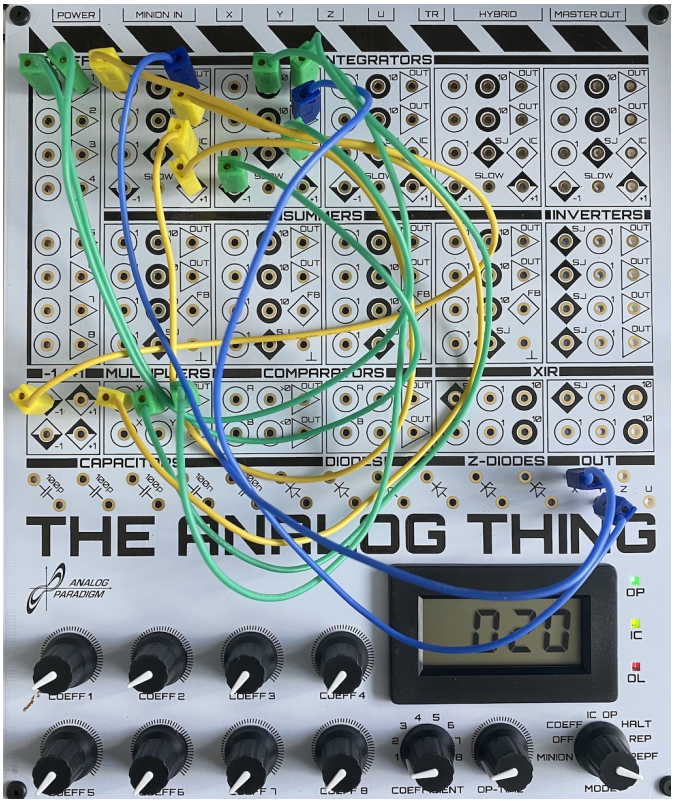

Figure 3: Setup of THE ANALOG THING for generating a Gaussian function