

Mathematical Synthesis and Making of Rope Mats and Rosettes

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Abstract

The workshop lets the participants synthesize and make a simple rope mat or rosette with thin hemp rope. The workshop is an extension of the presentation: *The Old Art of Rope Work and Fourier decomposition*.

Introduction

The nice thing about mathematical modelling of rope mats and rosettes is that we can use these models for synthesising old and new patterns. The workshop gives a short introduction using WinPlot for experimenting with a few patterns. On the basis of a suitable pattern the participants learn how to make a template showing where the strings are passing over and below each other. This template is later used for making the mat or rosette using thin hemp rope and pins.

Simulation

The participants install the program WinPlot¹ and immediately start experimenting with patterns like square mats and Turk's Head rosettes (figure 1).

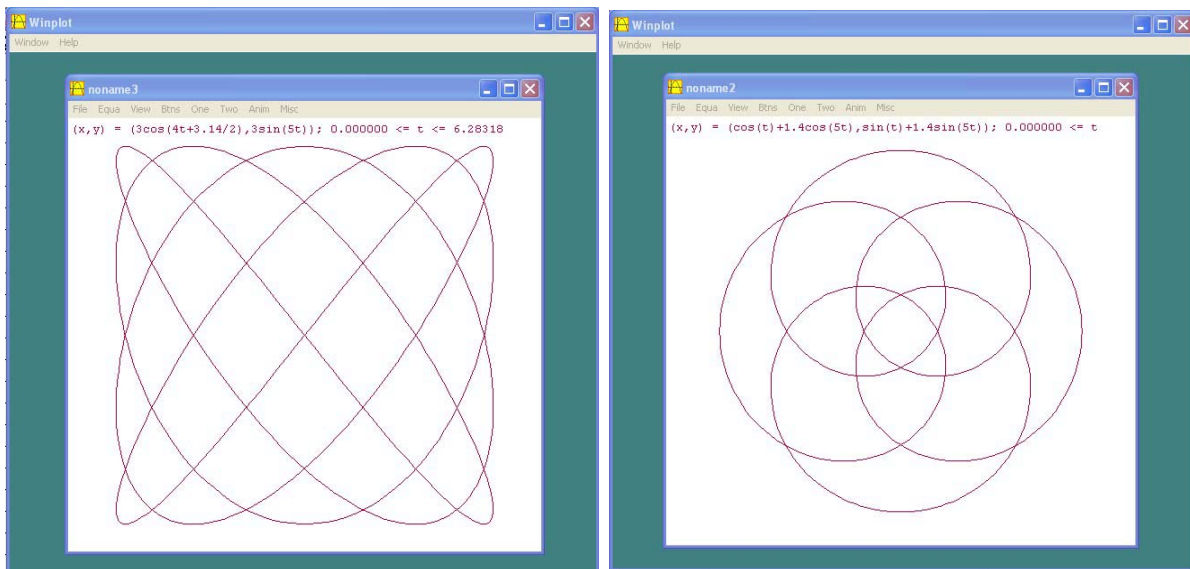


Figure 1 Left - Square mat with 54 bights ($x = 3\cos(4t + \pi/2)$, $y = 3\sin(5t)$),
Right - Turk's Head rosette with 4 bights ($x = \cos(t) + \cos(5t)$, $y = \sin(t) + \sin(5t)$).

1. A free version of WinPlot can be downloaded from <http://math.exeter.edu/rparris/winplot.html>

Preparations

When the pattern design is ready, it is time to decide where the string should pass above and where to pass below the crossing string. This is mostly much easier than expected. The starting point is arbitrary, and you can usually follow the string and mark every second crossing as above and below as shown in figure 2.

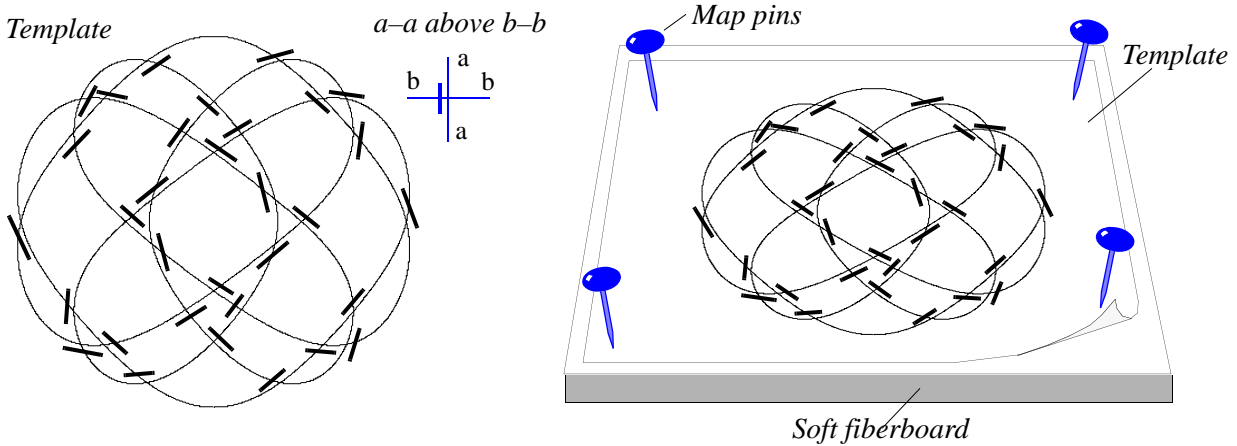


Figure 2 Left – Template for a heart mat marked with lines indicating which string passes over. *a-a* passing over *b-b*. Right – The template is attached to a soft fibreboard with map pins.

Secondly, print out the template and attach it to a soft fibreboard with map pins (figure 2 – Right). Hemp is a pleasant material to work with. Choose a suitable rope dimension. For this project 3–5 mm is appropriate. Before starting, the length of rope needed to complete one lap through the pattern must be stipulated. This may be done by allowing the rope briefly to follow the route without threading. The last preparation is to soften the rope by pulling it back and forth around a leg of a table or a chair. Now we are ready to start.

Making the rope mat

Choose a place to start along the periphery of the pattern and start placing the rope along the route. Use map pins to keep the rope close to the route. The marks on the template show if we should pass above or creep below a crossing point. At the beginning there will be many crossing points with no crossing rope. This will however, change during the process. At the end you will return to the starting point, finished with the first turn. If we still have some rope left, we can start at the next turn. When the end of the rope is reached, a new length is cut from the supply and we continue where the previous rope ended. The joining of the two ends may be done quite simply by using needle and thread and fastening them to the rear side of the mat. Figure 3 shows some examples of rope mats and rosettes synthesised by mathematical models.

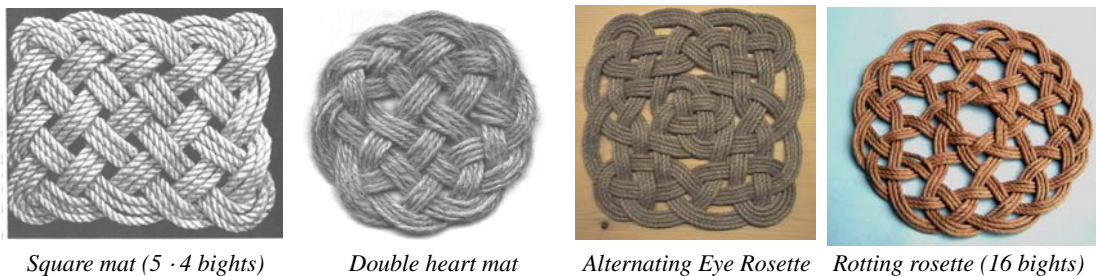


Figure 3 Examples of rope mats and rosettes. From left - Square mat (5 · 4 bights), Double Heart mat, Alternating Eye Rosette and Rotting rosette (16 bights).