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Semestrální práce z PJW - ZS 1999

Téma:

Lisajousovy obrazce
Lissajous figures

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V Praze dne: Podpis

Abstract

This document is a description of my semestral work in Programming Languages for WWW. The issue was to write an application or an applet which can draw Lissajous figures according to some user input parameters, for educational purposes.

1 Introduction

Lissajous figures are curves you get as a result of superposition of two harmonic oscillations in perpendicular directions to each other. The motion can be described for example by two time-dependent sinusoidal functions:

$$x(t) = A_x \sin(\omega_x t + \phi_x)$$
$$y(t) = A_y \sin(\omega_y t + \phi_y)$$

where	x,y	are the coordinates of the moving point
	A_x,A_y	are amplitudes
	ω_x,ω_y	are frequencies
	ϕ_x,ϕ_y	are phases
	t	is time

2 Features

This java program was primarily written as an applet, but it is also possible to run it as a java application.

User can control three parameters - amplitude, frequency and phase - of both signals. Input is possible using a slidebar or a textbox. The slidebar values are limited as folows, while the textboxes have no limitations:

amplitudes	(0..1)	
frequencies	(0..50)	the input value is only the f_x of $\omega_x = 2\pi f_x$
phases	(0..360)	in degrees

3 Implementation

When one of the input frequencies for the Lissajous figures is an iracional number (like π), the result should be an unclosed curve. However this is not possible to implement on the computer, since the input frequencies are always limited by the variable type I use for them. So I could presume, that the curve will be always closed. It always depends mainly on the commensurableness of the two given frequencies, so it might happen, that when these are not "very commensurable", the whole drawing area will be filled.

The output is kind of "self-repairing" so don't be bothered by some fast wrong outputs and sudden redraws, when entered "wild" frequencies, it's just the stage, when the time constants are being adjusted. The slidebar-adjustable values should be the reasonable input.