Analysis of Dynamical Systems

Variant 14

Part 1: Velocity dependent forced oscillation

Analyse 2-D system.

$$(1 + \lambda x^2)\,\ddot{x} - \lambda x \dot{x}^2 + \alpha \dot{x} + \omega_0^2 x = f \sin(\omega t),$$

where λ, α, ω_0, ω, and f are constants.

Parameter	version **14.1**	version **14.2**
λ	2.4	1.4
α	1.1	4.1
ω_0	5.0	4.3
f	2.7	6.1
ω	3.78	2.98

Part 2: Sprott M, chaotic flow

Determine whether the following 3-D system represents a strange attractor or not.

$$\begin{cases} \dot{x} = -z, \\ \dot{y} = -x^2 - y, \\ \dot{z} = 1.7 + 1.7\,x + y. \end{cases}$$