Analysis of Dynamical Systems

Variant 10

Part 1: Morse equation

Analyse 2-D system.

$$\ddot{x} + \alpha\dot{x} + \beta\left(1 - \mathrm{e}^{-x}\right)\mathrm{e}^{-x} = F\cos(\omega t),$$

where α, β, F, and ω are constants.

Parameter	Value
α	0.8
β	8
F	2.5
ω	4.171

Part 2: Sprott E, chaotic flow

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

$$\begin{cases} \dot{x} = yz, \\ \dot{y} = x^2 - y, \\ \dot{z} = 1 - 4x. \end{cases}$$