

ANALYSIS OF DYNAMICAL SYSTEMS

Variant 2

Part 1: Bacterial respiration by Fairén and Velarde

Analyse 2-D system.

$$\begin{cases} \dot{x} = B - x - \frac{xy}{1 + Qx^2}, \\ \dot{y} = A - \frac{xy}{1 + Qx^2}, \end{cases}$$

where constants A , B and Q are positive.

Parameter	version 2.1	version 2.2
A	2.0	2.0
B	3.0	3.0
Q	6.5	3.5

Part 2: Lorenz attractor¹

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

$$\begin{cases} \dot{x} = \sigma(y - x), \\ \dot{y} = rx - y - xz, \\ \dot{z} = xy - bz, \end{cases}$$

where σ , r , and b are constants.

Parameter	value
σ	10
b	8/3
r	28

¹Some aspects of the dynamics of this system are discussed during the lectures.