

# ANALYSIS OF DYNAMICAL SYSTEMS

## Variant 6

### Part 1: Chemical reaction (chlorine dioxide–iodine–malonic acid reaction)

Analyse 2-D system.

$$\begin{cases} \dot{x} = a - x - \frac{4xy}{1+x^2}, \\ \dot{y} = bx \left(1 - \frac{y}{1+x^2}\right), \end{cases}$$

where  $a$  and  $b$  are constants.

Parameter	version <b>6.1</b>	version <b>6.2</b>
$a$	10	10
$b$	4	2

### Part 2: Lorenz-84 model

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

$$\begin{cases} \dot{x} = -y^2 - z^2 - ax + aF, \\ \dot{y} = xy - bxz - y + G, \\ \dot{z} = bxy + xz - z, \end{cases}$$

where  $a$ ,  $b$ ,  $F$  and  $G$  are constants.

Parameter	value
$a$	0.25
$b$	4.0
$F$	8.0
$G$	1.0