# ANALYSIS OF DYNAMICAL SYSTEMS

## Variant 5

### Part 1: Duffing oscillator[1]

Analyse 2-D system.

$$\ddot{x} + \delta\dot{x} - \beta x + \alpha x^3 = f\cos(\omega t),$$

where $\alpha$, $\beta$, $\delta$, $\omega$, and $f$ are constants.

| Parameter | version **5.1** | version **5.2** |
|:---:|:---:|:---:|
| $\alpha$ | 100 | 1 |
| $\beta$ | 1 | 1 |
| $\delta$ | 1 | 0.15 |
| $\omega$ | 3.679 | 1.12 |
| $f$ | 2.4 | 0.3 |

### Part 2: Sprott A, chaotic flow

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

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

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