DA Toy Models: L63

$$\frac{\mathrm{d}x}{\mathrm{d}t} = \sigma(y - x),$$

$$\frac{\mathrm{d}y}{\mathrm{d}t} = x(\rho - z) - y,$$

$$\frac{\mathrm{d}z}{\mathrm{d}t} = xy - \beta z.$$

The constants:
$$\sigma = 10,$$
$$\rho = 8/3,$$
$$\beta = 28$$
are the system parameters, chosen such that we have a chaotic system.

The equations relate the properties of a two-dimensional fluid layer uniformly warmed from below and cooled from above. In particular, the equations describe the rate of change of three quantities with respect to time:
- x is proportional to the rate of convection,
- y to the horizontal temperature variation,
- and z to the vertical temperature variation.

DA Toy Models: L96

For $i = 1, \ldots, N$:

$$\frac{dx_i}{dt} = (x_{i+1} - x_{i-2})x_{i-1} - x_i + F$$

where it is assumed that

$$x_{-1} = x_{N-1}, x_0 = x_N \text{ and } x_{N+1} = x_1$$

Here, x_i is a system variable and F = 8 is a forcing term.