DynIbex Library

They look like this:

0.1 Main Equation:

The sthocastic hybrid model for the solar water heating has 3 discrete variables such as, $\boldsymbol{r_n} \in \{0, 1\}$, $\boldsymbol{v_n} \in \{0, 1\}$ and $\boldsymbol{p_n} \in \{1, 2, 3\}$ and where $n = t\tau$ and $\tau = 15$ min is the period.

$$\begin{aligned}\frac{d}{dt}T(t) = -\frac{2.8811059759131854e^{-06}(T(t) - T_{env}(t))}{V(t)} - \boldsymbol{v_n}.\frac{9.34673995175876e^{-05}(T(t) - T_{in}(t))}{V(t)} \\ -sgn(0.1\boldsymbol{p_n} - V(t))\frac{9.34673995175876e^{-05}(T(t) - T_{in}(t))}{V(t)} \\ +\boldsymbol{r_n}.\frac{0.00048018432931886426}{V(t)} + \frac{8.403225763080125e^{-07}I_e}{V(t)}\end{aligned} \tag{1}$$

$$\frac{d}{dt}V(t) = 0.001(0.1\boldsymbol{p_n} - V(t)) \tag{2}$$

$$\frac{d}{dt}E_c = k\boldsymbol{r_n}0.00048018432931886426 \tag{3}$$

0.1.1 DynIbex

$T_{env}(t) \in [40 - 45]$, $I_e \in [0 - 900]$ and $T_{in}(t) \in [30 - 35]$

0.2 Equation 1:

$$\frac{dx_1}{dt} = \frac{x_1}{x_0}, x_1(0) = [1.0, 50.0] \tag{4}$$

$$\frac{dx_0}{dt} = 1, x_0(0) = [1.0, 10.1] \tag{5}$$

For a T(period) = 10, we got:

0.2.1 Simulation with DynIbex

step = 1e-5:
$x_1(t = 10) =$ [ENTIRE] , $x_0(t = 10) =$ [ENTIRE]

0.2.2 Simulation with Euler Method

step = 1e-5s:
$x_1(t = 10) =$ [1.09901, 100] , $x_0(t = 10) =$ [2, 11.1]