We have set up following tests:

- RUN TESTS:
  - Linear Model Unit Tests
    - `LinearStateSpaceModelPSMCEstimation_UNIT_TEST.m`

    The above script tests the behavior of a linear state model:

    State transition function:

$$\boldsymbol{x}_t = \begin{bmatrix} 1 & \Delta t \\ -\frac{k_2}{m}\Delta t & 1 - \frac{k_1}{m}\Delta t \end{bmatrix} \boldsymbol{x}_{t-1} + \boldsymbol{v}_t, \tag{1}$$

    Observation function:

$$y_t = \begin{bmatrix} 1 & 0 \end{bmatrix} \boldsymbol{x}_t + n_t, \tag{2}$$

    where $\boldsymbol{x}_t = (x_{(t,1)}, x_{(t,2)})^T$, and k_1, k_2, m, and Δt are the model static parameters. $\boldsymbol{v}_t$ and n_t follows the normal distribution $N(\boldsymbol{0}, \boldsymbol{\Sigma}_x)$ and $N(0, \sigma_y^2)$, respectively.
  - GP Model Unit Tests

    The following test scripts can be available.
    - `KitagawaModelPSMCEstimation_UNIT_TEST.m`
    - `KitagawaModelPMCMCEstimation_UNIT_TEST.m`
    - `KitagawaModelPMCMC2Estimation_UNIT_TEST.m`
  - Plotting Unit Tests

    After executing `KitagawaModelPSMCEstimation_UNIT_TEST`, the following unit test can be used to check the Graph component.
    - `KitagawaModel_WriteGraphs_UNIT_TEST.m`
- COMPUTE TIME PROFILE TESTS:

  We have also set up compute time profile tests as follows:
  - `KitagawaModelPSMCEstimation_UNIT_TEST_COMPUTE_TIME.m`
  - `KitagawaModelPMCMCEstimation_UNIT_TEST_COMPUTE_TIME.m`
  - `KitagawaModelPMCMC2Estimation_UNIT_TEST_COMPUTE_TIME.m`

  By changing the number of particles, tests can be performed in these functions. The candidates of the number of particles are 10, 50, 100, 200, 500, and 1000.