

Uncertainty Management for PHM

A Tutorial in Python

This tutorial is hands on and requires Python (preferably Python3) installed on the computer. If Python is not available on your computer, it is recommended that the latest version of Anaconda be downloaded from this [link](#). The following codes will be used in this tutorial:

File: stateequation.py

This is a file one should not be running, but only be used to specify the models. It contains three functions:

1. One to specify the loading at any given time instant
2. One to specify the state equation
3. One to specify the RUL-threshold, that determines whether end-of-life has been reached or not. (RUL = remaining useful life)

File: parameters.py

This is a file one should not be running. It specifies all the parameters that will be used in the model, in the file stateequation.py. The values of the parameters can be changed by directly editing the contents of the file.

File: Prognostics101.py

This is a file that can be run to understand how to set up prognostics, but will not be actually used in the implementation of RUL prediction. The contents of this file will be rolled into a function in the file RULPredictor.py. This will be covered during the tutorial.

File: RULPredictor.py

This is a file one should not be running. This file simply creates a function that can calculate the RUL, using the functions in the stateequation.py file, and the parameters in the file parameters.py.

Files that are executables/main-files

Three files can be run from the Python console:

1. SetupUQ.py → Sets up basic Monte Carlo simulation for RUL prediction and plots the result.
2. FORM.py → Solves the RUL prediction problem using FORM
3. InverseFORM.py → Solves the RUL prediction problem using Inverse FORM