Abstract of the tutorial Stochastic Dynamics with Aerospace Applications

The tutorial consists of the 14 topics. For each topic, a numerical example in Matlab&Simulink and tasks for self-control are provided. You can find the scripts for the tutorial at the following link:

https://github.com/m-trifonov/Stochastic-Dynamics

Content

Topic 01 – Calculation of statistical characteristics and simulation of random variables and events.
Topic 02 – Calculation of a mean value and a variance of the stochastic process for its realization.
Topic 03 – Calculation of the covariance function of a stochastic process.
Topic 04 – Calculation of a spectral density of the stochastic process
Topic 05 – Frequency domain analysis
Topic 06 – Shaping filters.
Topic 07 – Statistical analysis of an ergodic LTI system using the Monte-Carlo method.
Topic 08 – Statistical analysis of a non-ergodic system using the Monte-Carlo method.
Topic 09 – Moment's equations method.
Topic 10 – Estimation problem on a full sample in a dynamic system using the least square method.
Topic 11 – Estimation problem on a full sample in a linear system.
Topic 12 – Estimation problem on a full sample in a non-linear system.
Topic 13 – Recurrent estimation of a linear system state.
Topic 14 – Simulation modeling using Kalman filter.