

The background of the slide features a complex network diagram. It consists of numerous small, dark grey circular nodes connected by thin, light grey lines. These lines form a web-like structure that fills the entire frame. A large, solid dark teal rectangle is positioned on the right side of the image, partially overlapping the network diagram. The text is centered within this teal rectangle.

Condition Monitoring of Structures, Machines and Processes

Tutorial

2

MATLAB: DATA PROCESSING

Exercise 14.1

Pre-processing Signals and Data Reduction

Task:

- Download the files Gear1_1e5.mat and Gear3_1e6.mat and load them into your MatLab workspace. The files correspond to recordings of structure borne noise signals of a bicycle hub in gear 1 and gear 2 with a sampling frequency of $f_s = 1e5$ and $f_s = 1e6$, respectively.
- Reduce the data of gear 3 to fit the sampling frequency of gear 1
 - Hint: Use the command `resample()` or work with the colon operator `:` as in `A(1:2:end)`
- Plot the data in two different plots.
- Determine the average and the root mean square of the amplitude of the signals.
- Advanced: Plot and interpret the frequency spectrum of each plot.
 - Hint: Use the `fft` command or the app signal analyzer initialised by executing the command `signalAnalyzer`.
 - Determine the peak frequency, that is, the frequency of highest magnitude in the FFT-plot.



Exercise 14.2

Classification

Task:

- The file GearX_1e5.mat is a recording of the bicycle hub in an unknown gear.
 - Based on the results of exercise 14.1 try to determine the gear.

