# The Function of Envelope Spectrum

Feature extraction based on envelope spectrum.

## Description

Envelope spectrum is a frequency feature of the signal. "Data Upload" is used to load the required data set and label set, and the required parameters should be set in the "Parameter" field.

## Parameter introduction

Parameters of envelope spectrum:

Sample parameters:

* Sampling frequency: Sampling frequency of the bearing. (data type: float)
* Fault Type: Type of bearing failure: BPFO (Ball Passing Frequency of Outer Race), BPFI (Ball Passing Frequency of Inner Race), BSF (Ball Spin Frequency), FTF (Fundamental Train Frequency).

Bearing parameters:

* Rotation frequency: Rotation frequency of the bearing. (data type: float)
* Number of rolling elements: Number of balls. (data type: int)
* Ball diameter: Diameter of balls. (data type: float)
* Pitch diameter: Pitch diameter. (data type: float)
* Initial contact angle: Initial contact angle. (data type: float)

Function parameters:

* Range of peak detection: Range of peak detection. (data type: int)
* Order: The order of the fault frequency. (data type: int)
* Limit: Upper limit of the frequency range for peak detection. (data type: float)

**Functional description of the main components**

The overall view of the function of envelope spectrum is divided into "Data Upload", and "Parameter".

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### Data Upload

The user needs to upload the data file and the label file. The uploaded data files and label files support ".mat", ".txt", ".csv", ".xls", and ".npy" format files.

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### Parameter

The user can set the parameters here.

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### Result

After the software has been run, click the "Download" button to download the relevant result data.

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**Examples**

The process of using envelope spectrum in feature extraction.

**Step 1: Configure the procedure**

Select "Feature Extraction and Reduction" from the process bar on the left side of the web page.



Then select the procedure that needs to be configured from the process display area.

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**Step 2: Upload the data file and the label file**

Select the data file and the label file to be applied from the local path.

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Click "Upload" after successfully selecting the upload data file, and then click "Save".

**Step 3: Select the function**

The ''Envelope Spectrum'' function is chosen for feature extraction.

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**Step 4: Set and save the parameters**

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Firstly, the user needs to select one fault type in "Fault Type". Then set the parameters in the blank box. For details about the parameters of the function, see "Parameter introduction".

Finally, click "Save" after all parameters are configured.

**Step 5: Execute the configured procedure**

Before executing the configured function, the user also needs to set the selected output file format.

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Finally, select "Run".

**Step 6: Download**

When the progress bar reaches the end, the task is completed.

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Click "Download" to download the file of data.

