# The Function of Occurrence Probability of Fault Characteristic Frequency (OPFCF)

Feature extraction based on OPFCF.

## Description

OPFCF 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 OPFCF:

Sample parameters:

* Sampling frequency: Sampling frequency of the bearing. (data type: float)

Here are four types of bearing faults:

* 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:

* Order: The order of the fault frequency. (data type: int)
* Interval: Two methods for determining the actual fault characteristic frequency capture interval.
* Fixed frequency interval: Capture interval with fixed frequency interval. (data type: float)
* Threshold: Coefficient of variance discrimination for the occurrence of actual faults. (data type: float)
* Percent: Capture interval with fixed percentage. (data type: float)
* ~~RUL Image: Whether to draw the OPFCF-RUL diagram. The RUL means the remaining useful lifetime.~~

**Functional description of the main components**

The overall view of the function of OPFCF 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 OPFCF 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 ''OPFCF'' 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 the fault type: "BPFO", "BPFI", "BSF", and "FTF". Then select one interval in "Interval".

Next, set the parameters in the blank box. ~~The user can select "True" or "False" based on whether to draw the OPFCF-RUL diagram.~~ 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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~~If the user selects "True" in "RUL Image", the OPFCF-RUL diagram will be drawn and saved.~~ In the following OPFCF trend diagram, as the RUL (Remaining Useful Life) decreases, the OPFCF value becomes larger, which means the occurrence probability of failure becomes larger, and eventually it can converge to 1.

**图表, 折线图, 直方图

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Click "Download" to download the file of data and image.

