HRTex V2.0

Documentation

1. Introduction

HRTex is a high-resolution texture data processing tool for monochromatic neutron diffraction based on pixel projection method.

Neutron diffraction is an important non-destructive method to measure statistically the texture and strain within bulk materials. To fulfil the requirement of high-precision measurements of complex texture, HRTex provides a high-resolution, accurate, fast and automatic solution for the raw data processing of texture measurements by monochromatic neutron diffraction. The outputs are a pole figure and a xlsx file of normalized pole density. This software has been successfully tested with the raw datasets from CMRR and ANSTO.

2. Hardware and software environment

CPU: Any Intel or AMD x86-64 processorHard disk: 2GB or moreMemory: 2GB or moreOS: Windows 10 or higher versionSoftware: MATLAB Runtime 9.1 or higher version (included in installer)

3. Installation

The installer of HRTex is available at <u>https://na.sjtu.edu.cn/</u> for free. If the MATLAB Runtime has not been installed in your computer before, please select the option. The main steps of installation of HRTex are shown as following:

3.1. Start to install HRTex

HRTex Installer	<u></u>		×
Connection Settings		_	
HRTex 2.0 HRTex is a high-resolution texture data processing tool for monochromatic neutron diffraction based on pixel projection method. HRTex is a tool to process the raw data of 2D detector for texture measurements by monochromatic neutron diffraction. The outputs are a pole figure and a ;®xlsx;" file of normalized pole density. This software has been successfully tested with the raw datasets from CMRR and ANSTO. Jian Yang, Shengyi Zhong sjtu.yangjian@gmail.com, shengyi.zhong@sjtu.edu.cn			
< Back Next > Cancel			

3.2. Choose installation folder for HRTex

Installation Options			×
Choose installation folder:			
C:\Program Files\HRTex	Browse		
	Restore Default Folder		
Add a shortcut to the desktop			
< Back Next >	Cancel		

3.3. Choose installation folder for MATLAB Runtime (if needed)

Required Software	– 🗆 X				
MATLAB Runtime is required.					
Choose installation folder:	MATLAB [*]				
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3.5. Confirmation



3.6. Installation

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4. Operation

4.1. Configuration

- 4.1.1. After HRTex is launched, the users need to select or enter the file path which contains all the raw texture data of a complete pole figure. A dataset is provided for testing. Users can download the zip file from <u>https://na.sjtu.edu.cn/</u>.
- 4.1.2. Then select file type. In txt (CMRR) option, the default parameters are based on the experimental configuration of the diffractometer RSND of CMRR. They are suitable for the testing dataset mentioned in 4.1.1. If users switch to HDF (ANSTO) option, the default setting will change to fit the diffractometer Kowari of ANSTO.
- 4.1.3. Users are free to calibrate the parameters according to their experimental setup. Also, users can load special rotation of their sample in the format of xlsx file containing the value of ω , χ , and φ at every acquisition step. See the example in Figure 4.1.

	А	В	С
1	Omiga	Chi	Phi
2	26.16718	9	0
3	26.16718	9	5
4	26.16718	9	10
5	26.16718	9	15
6	26.16718	9	20
7	26.16718	9	25
8	26.16718	9	30
9	26.16718	9	35
10	26.16718	9	40

Figure 4.1. Example of special rotation xlsx file.

4.1.4. Users can check the diffraction geometry by clicking the 'Preview' button, as shown in Figure 4.2.

MATLAB App -		×
Configuration Data Elaura		
Configuration Pole Figure File Path C:\/AI(111) Default Setting CMRR (txt) ANSTO (HDF) Measured hkl 111<	1.58	
Load Special Rotation Detector Pixel Width (mm) 0.7624 Pixel Number 256 × Detector Center Position (°) 20 40 n 270 Sample Detector Distance (mm) 1005		
Preview		

Figure 4.2. Configuration of parameters

- 4.2. Pole figure calculation
- 4.2.1. After finishing the configuration part, users need to move to 'Pole Figure' sheet and click 'Load Data' button. After a few of seconds, the superposed detector image will show (Figure). Users are free to transform the layout of the data to fit the diffraction geometry with buttons of 'Rotate', 'Flip Left-Right', and 'Transpose'.
- 4.2.2. Users can adjust the color bar type and the resolution of pole figure. Then click 'Draw Pole Figure' button, and the pole figure will be generated in a few seconds (Figure). Also, users can adjust the maximum value of the color bar and click 'Draw Pole Figure' button again.
- 4.2.3. Users can save the pole density values as an xlsx file by clicking 'Save as xlsx' button.

MATLAB App		- (D	×
Configuration Pole Figure				
Load Data	Pole Figure			
Superposed Image				
Rotate Flip Left-Right Transpose				
Color Bar				
● Parula ○ Jet				
Pole Figure Resolution (°) α 1 β 5				
Pole Density Max 0				
Ready to calculate				
Draw Pole Figure Save as xlsx				





Figure 4.4. Calculate pole figure

5. Authors

Jian Yang SJTU - Paris Elite Institute of Technology Shanghai Jiao Tong University E-mail: <u>sjtu.yangjian@gmail.com</u>

Shengyi Zhong SJTU - Paris Elite Institute of Technology School of Materials Science and Engineering Shanghai Jiao Tong University E-mail: <u>shengyi.zhong@sjtu.edu.cn</u>