

T i t a n i u mのODF解析表現

2023年10月24日

HelperTex Office

概要

Hexagonalでは、3指数 $\langle \quad \rangle$ 4指数表現と

X軸の取り方 $[100] \langle \quad \rangle [210]$ 又は、 $[2-1-10] \langle \quad \rangle [10-10]$ でODF図が異なります。

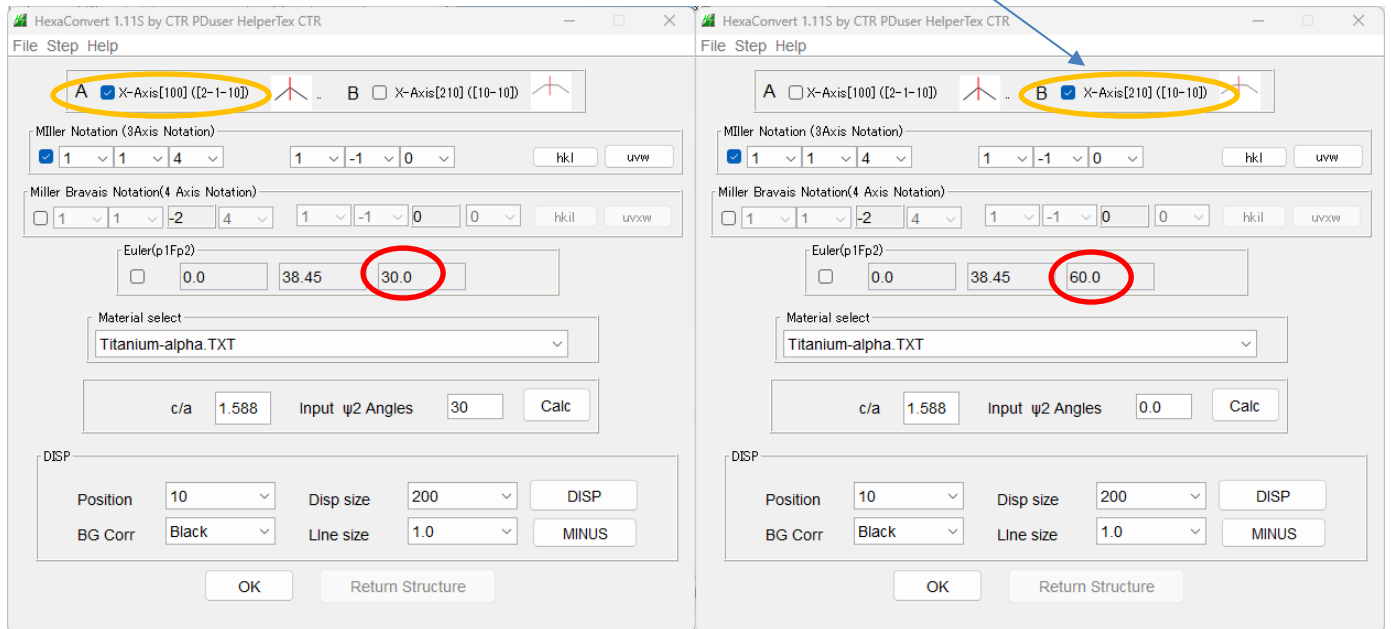
手持ちのODFソフトウェアがどの表現を用いているか把握してみます。

日本国内では、X軸を $[10-10]$ のB-Typeが採用されている。

(チタンおよびチタン合金の集合組織 井上博史) 金属 VOL.69(1999) No.1

LaboTex, TexTools, MTEX, newODF (SmartLab) の比較

使用する方位



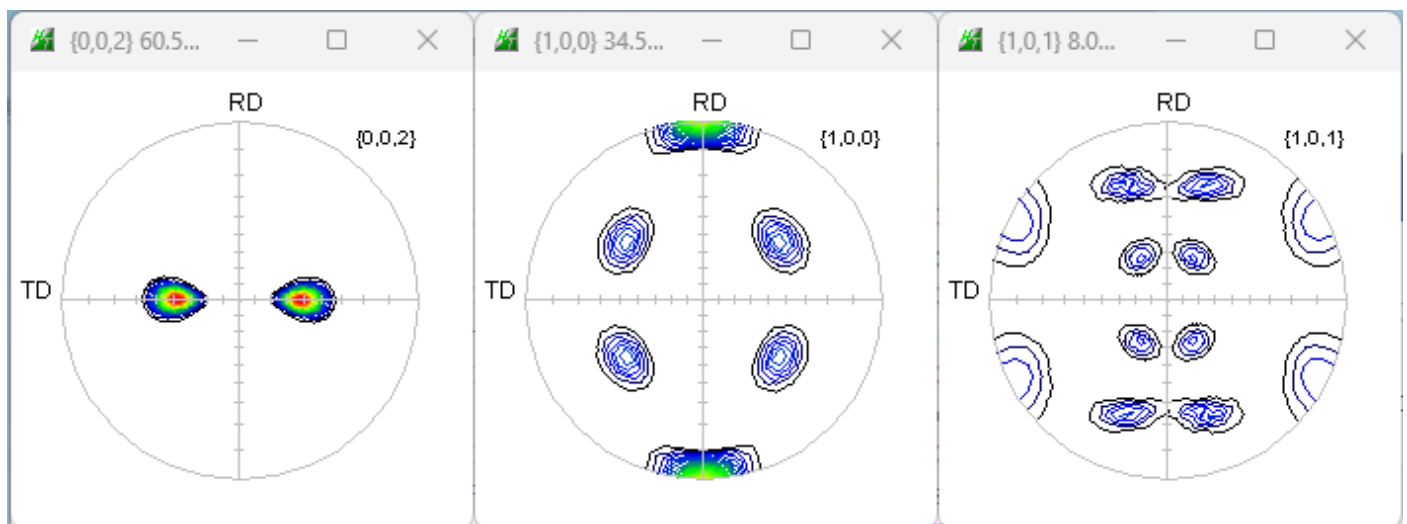
X軸により、Euler角度の ϕ_2 が異なります。

上記方位による極点図

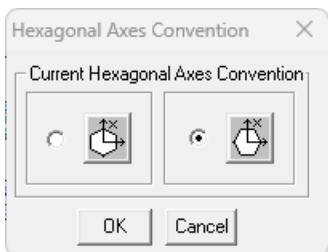
$\{0002\}$

$\{10-10\}$

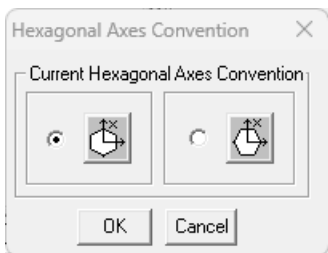
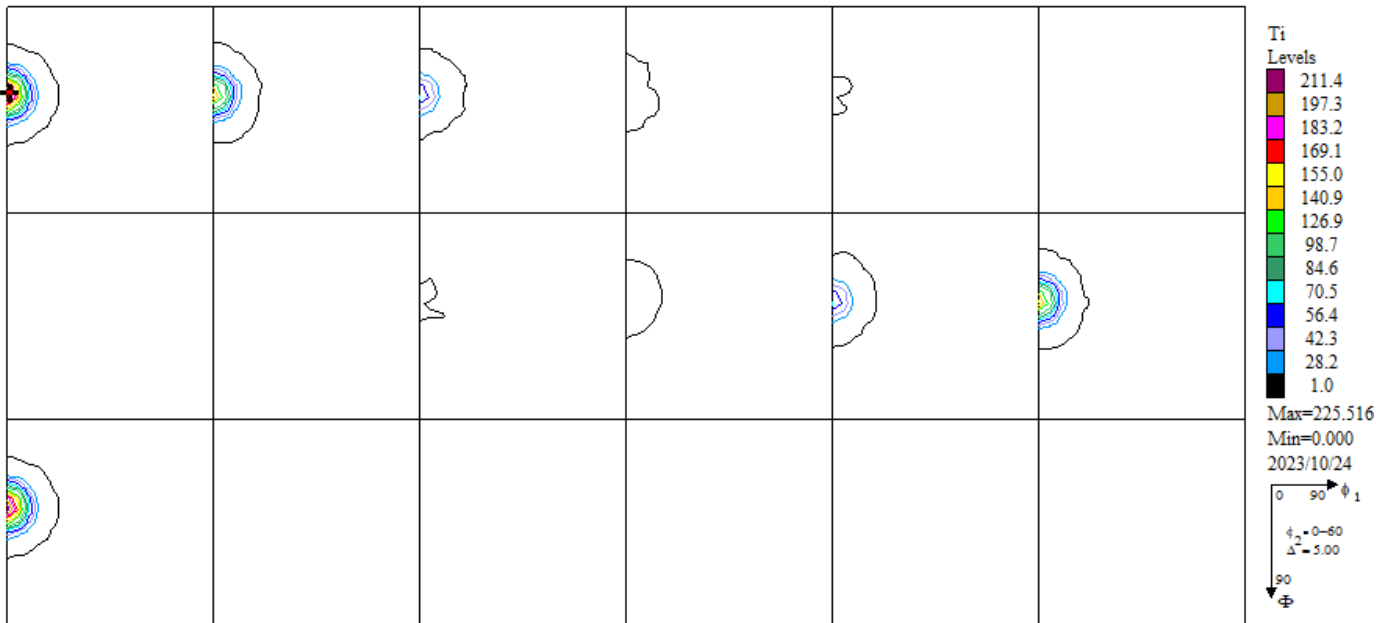
$\{10-11\}$



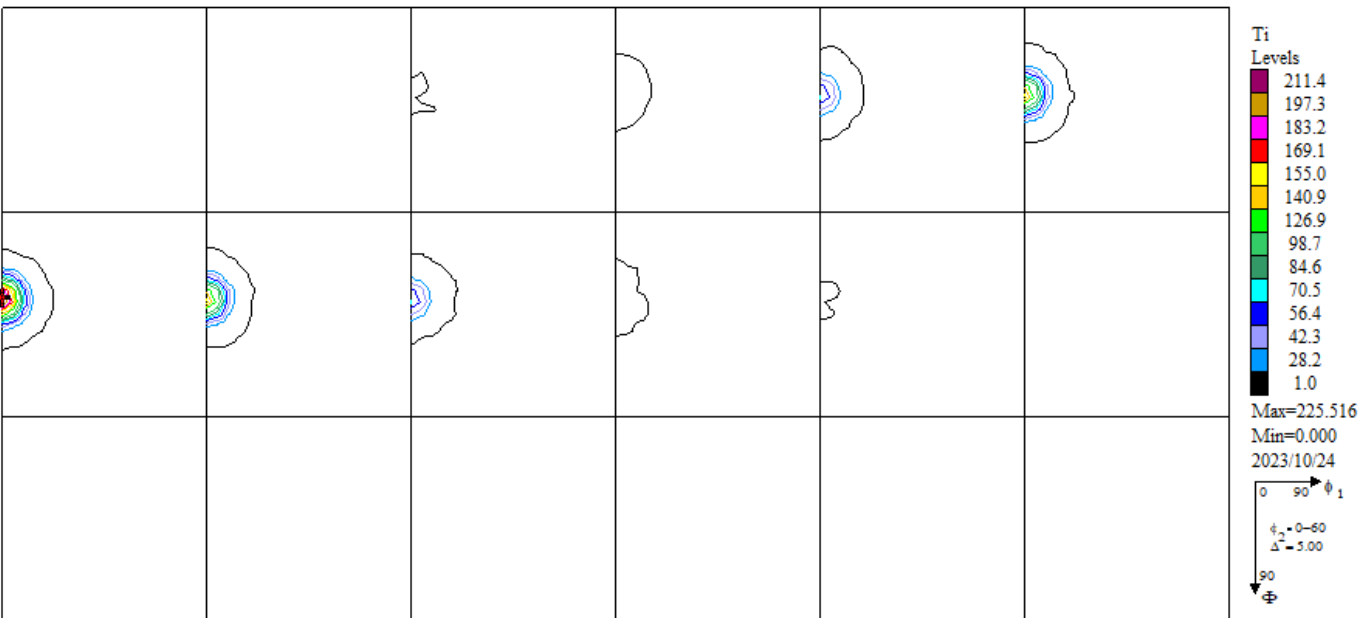
LaboTexによる解析 A-Type、B-Type切り替えが可能



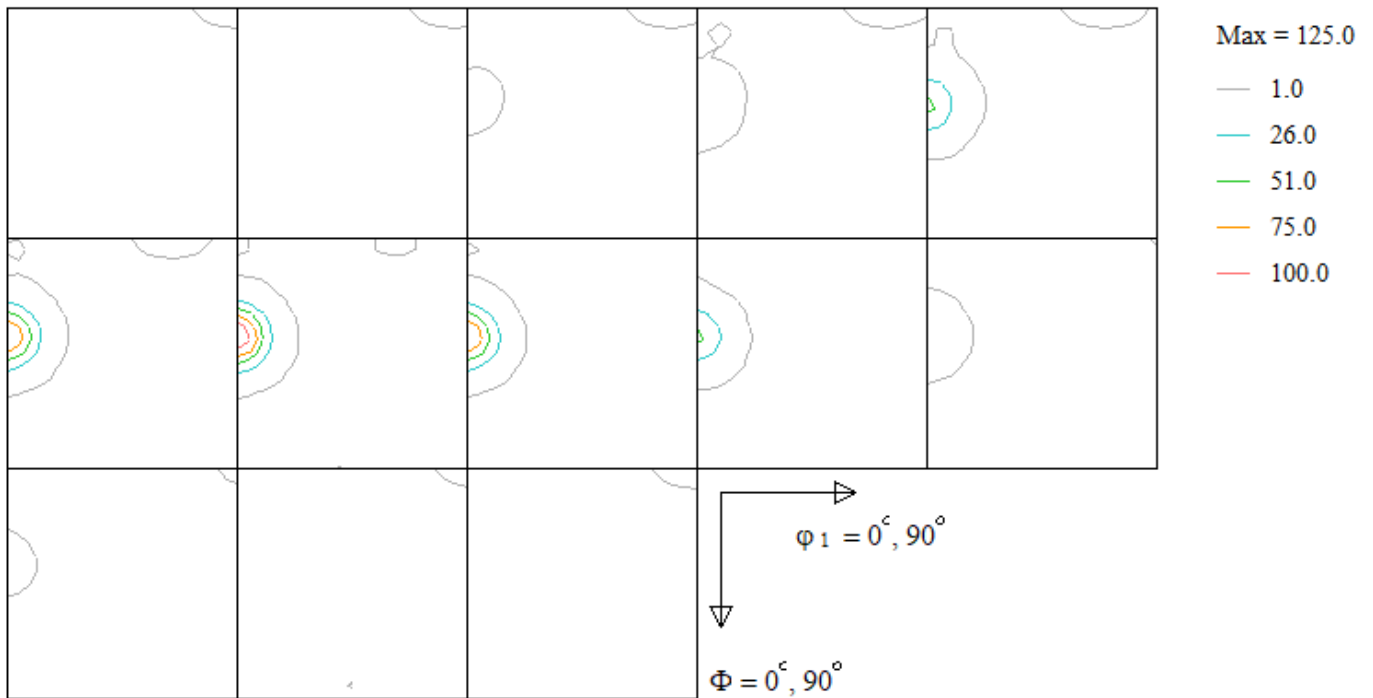
Navigation icons: left, up, refresh, down, right. Step: 5.00. $\theta_1 = 1.46$. $\Phi = 38.05$. $\theta_2 = 0.00$. HKL: (-1 2 4). UVW: [2 1 0]



Navigation icons: left, up, refresh, down, right. Step: 5.00. $\theta_1 = 0.00$. $\Phi = 38.47$. $\theta_2 = 30.00$. HKL: (1 1 4). UVW: [1 -1 0]

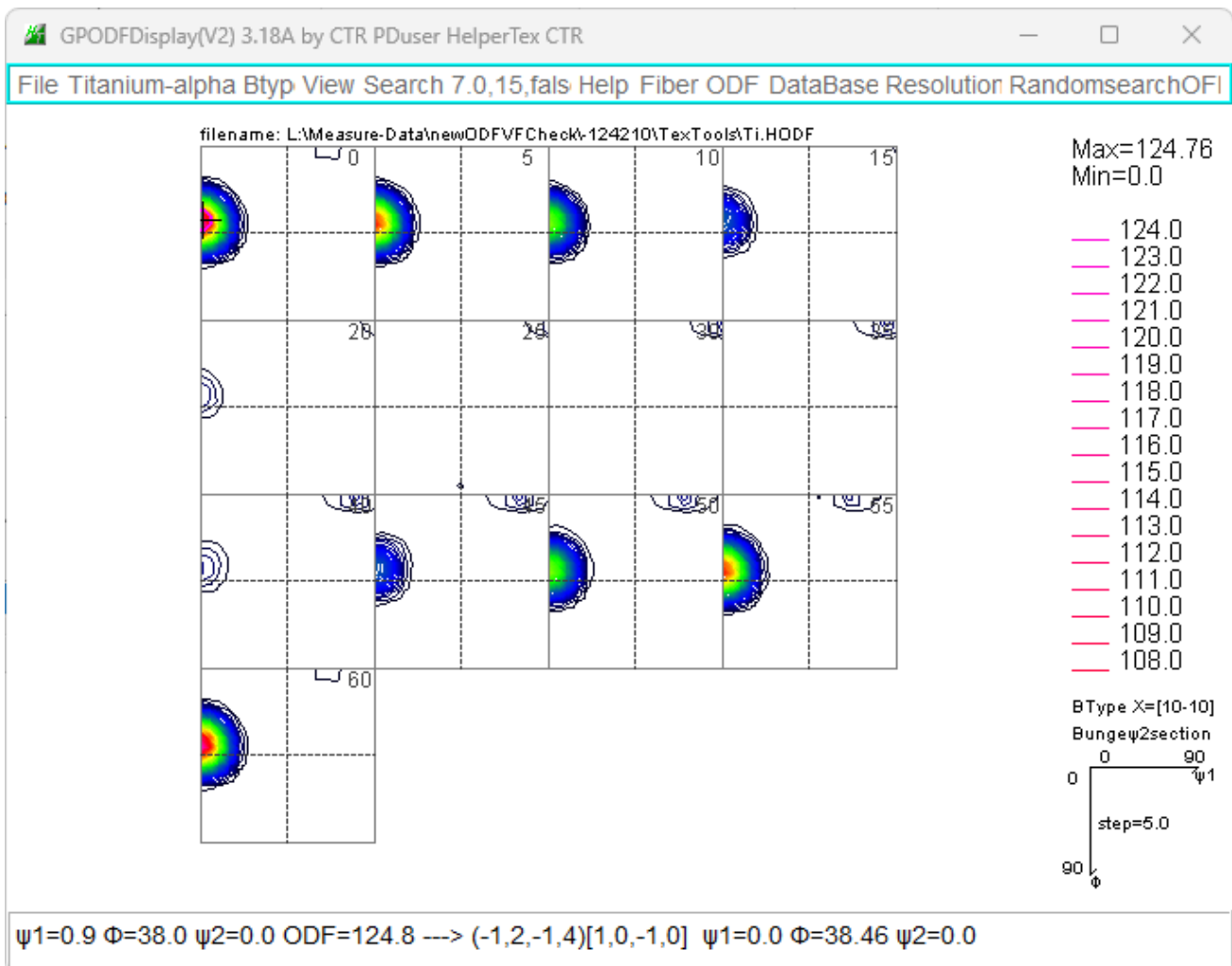


TextToolsはA-Type

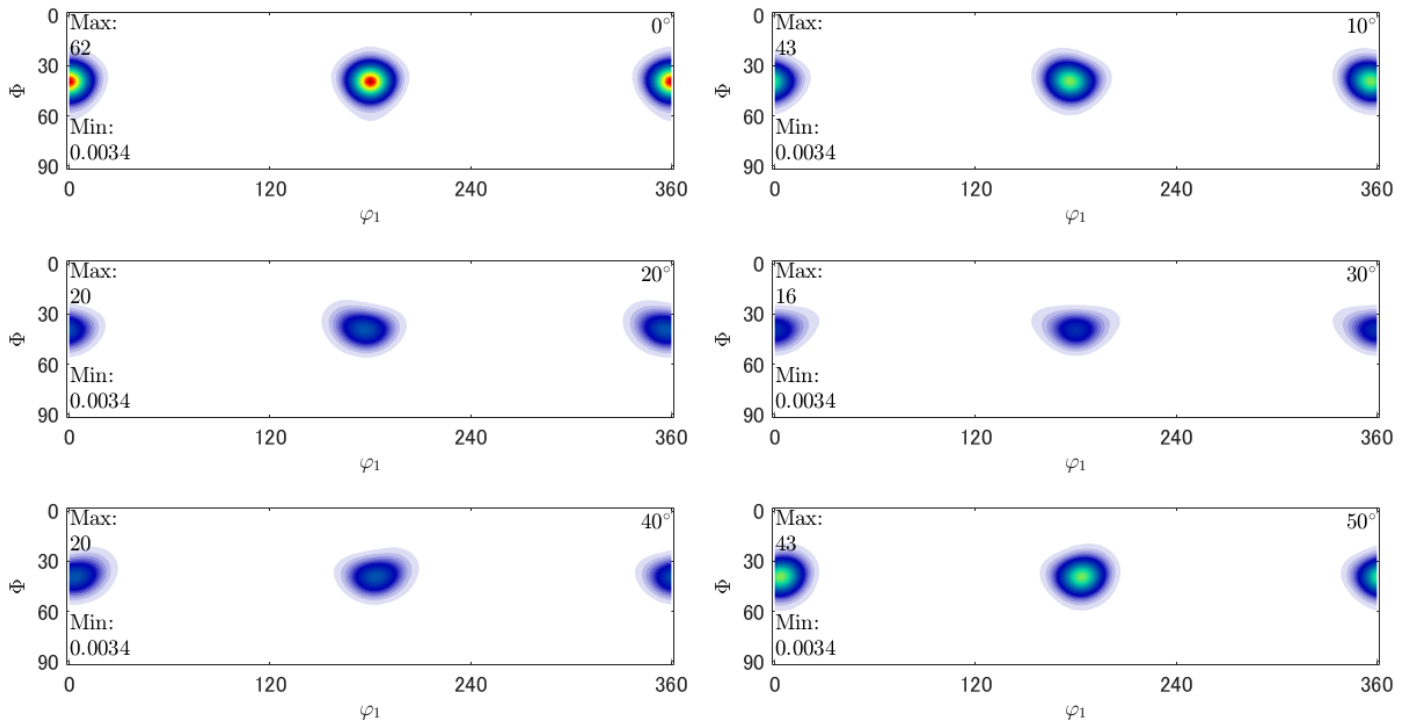


B-Type表記

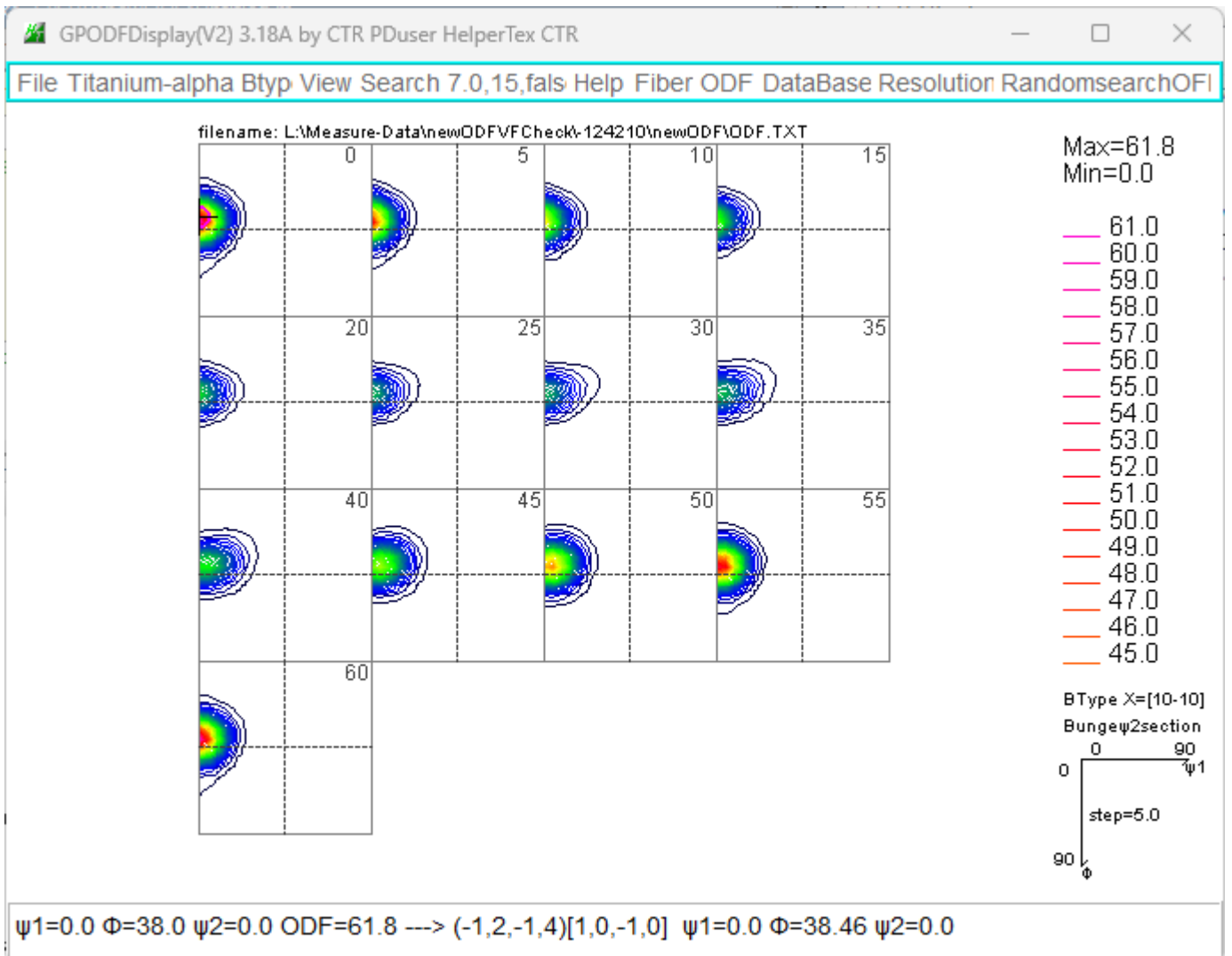
A-TypeでExportし、GPODFDisplayにてA->B変換し、4指数で決定



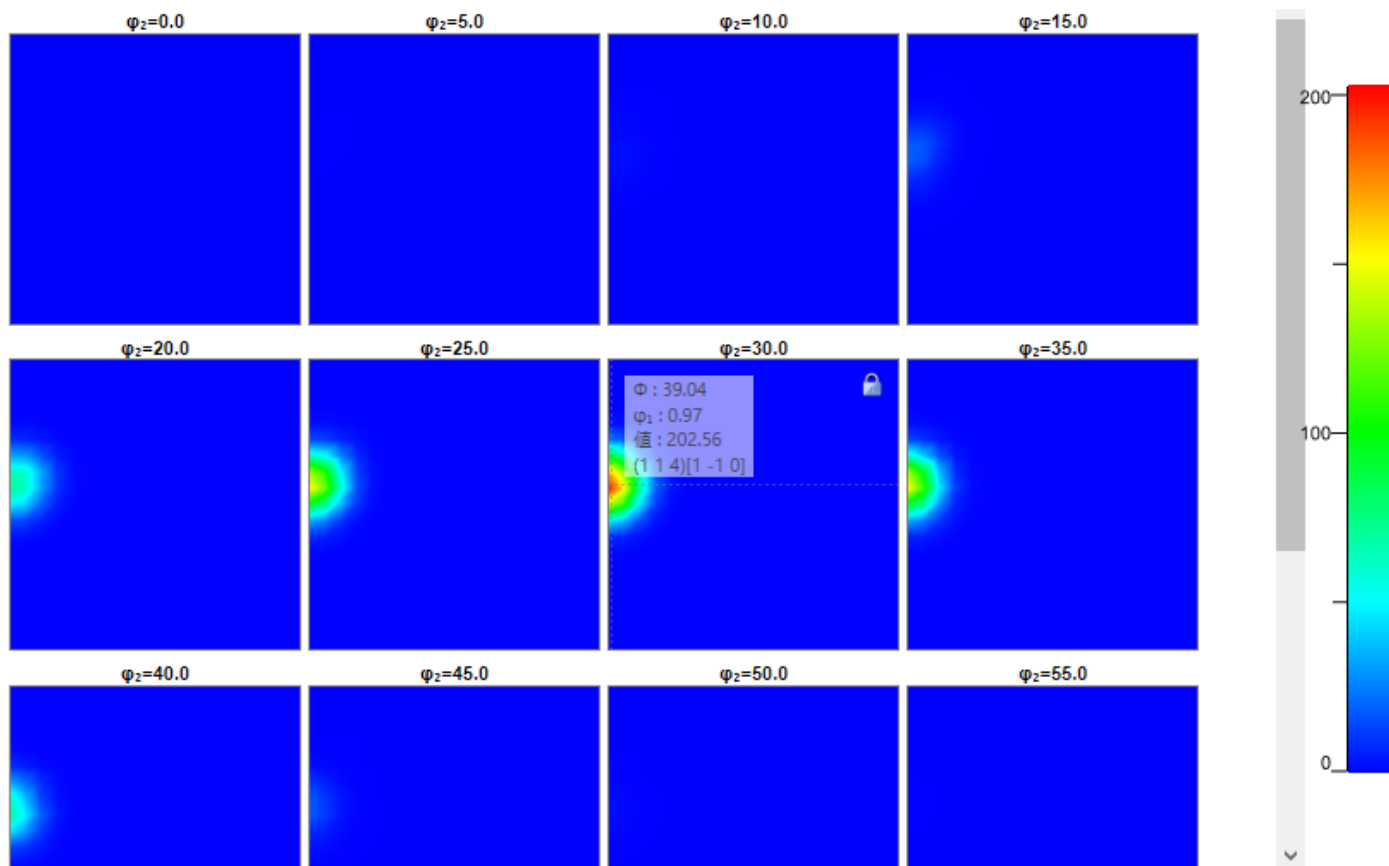
MTEXはB-Typeで解析される



B-TypeでExportし、Triclinic->Orthorhombic 変換

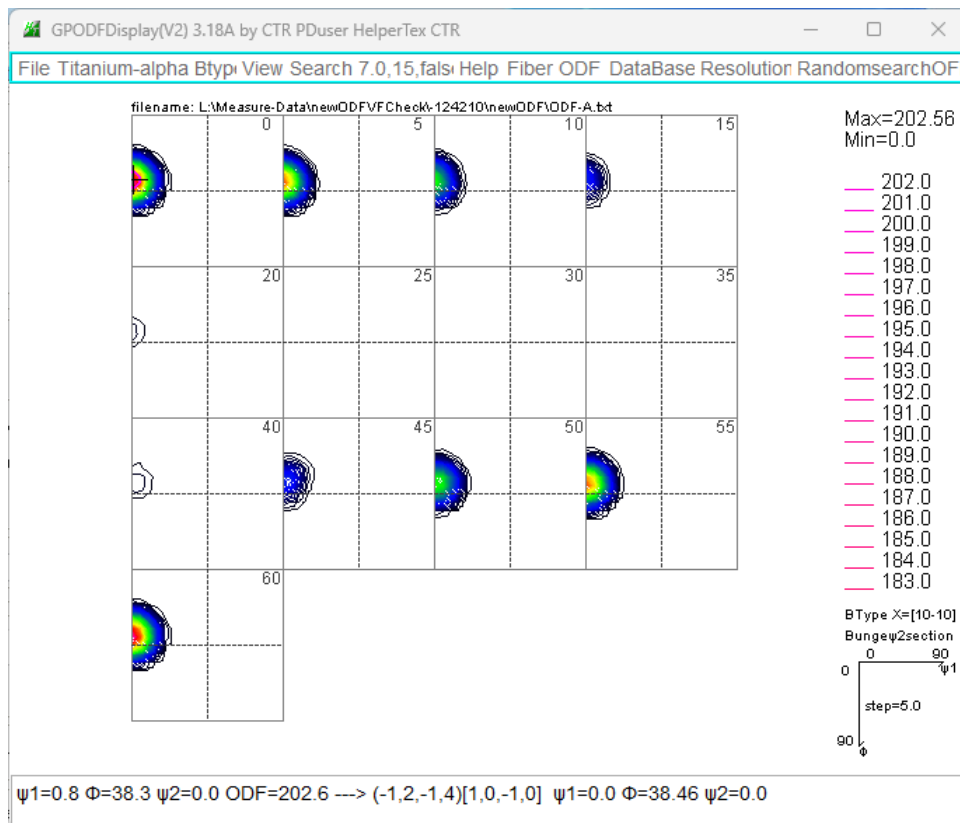


newODF (SmartLab) はA-Typeで解析



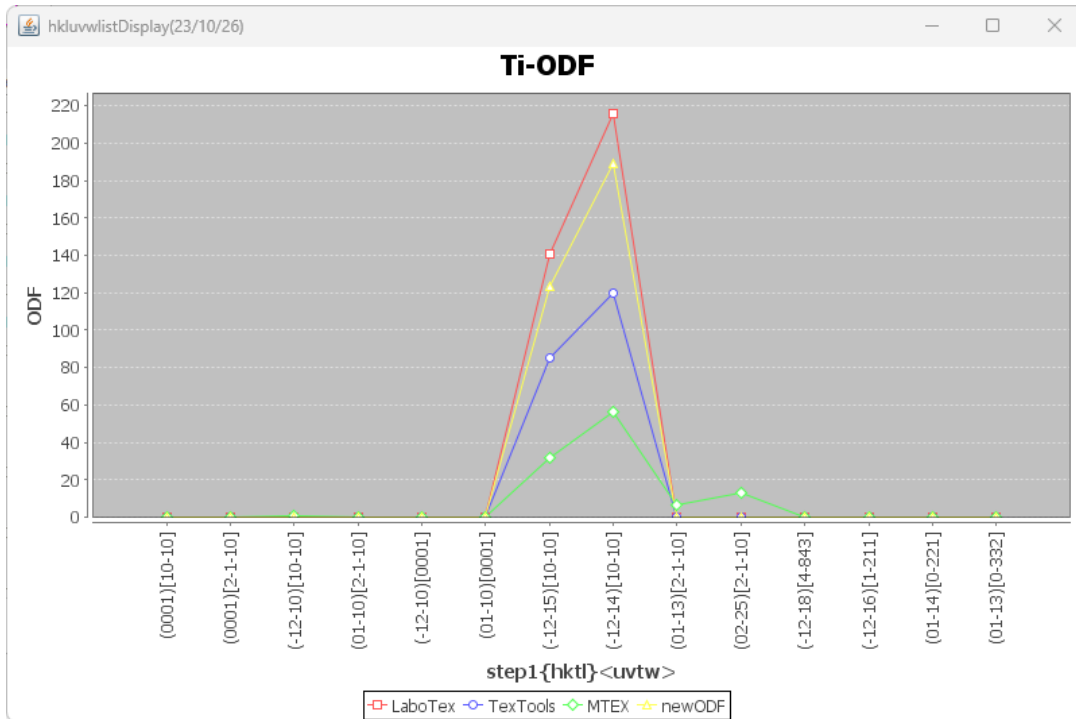
CTRODF

A-TypeでExportし、GPODFDisplayにてA→B変換し、4指数で決定



まとめ

GPODFDisplayのODFListより

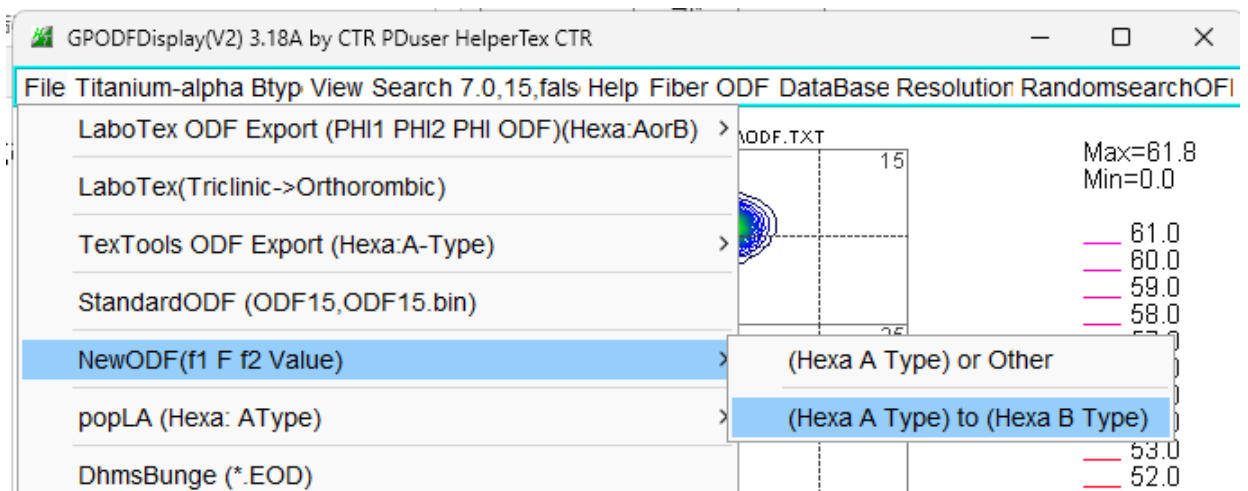


	ODFMax	X 軸		表示	
		[2-1-10]	[10-10]	3-Axis	4-Axis
LaboTex	225.5	0	○	0	
TexTools	125	0		0	
MTEX	62		○		○
newODF(SmartLab)	202.56	0		0	
CTRODF		0	○	0	○

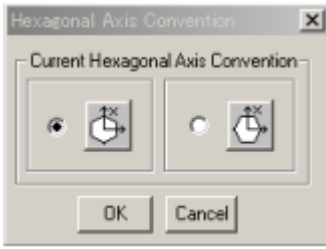
(チタンおよびチタン合金の集合組織 井上博史) 金属 VOL.69(1999) No.1 の表現実現は CTRによるGPODFDisplayにて可能

ODF図読み込み時、AB変換を指定し行っています。

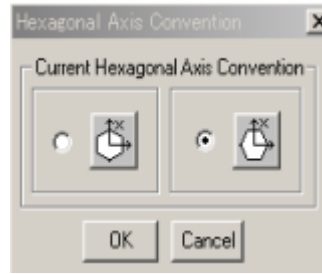
例えば、neweODFの場合 A-B変換



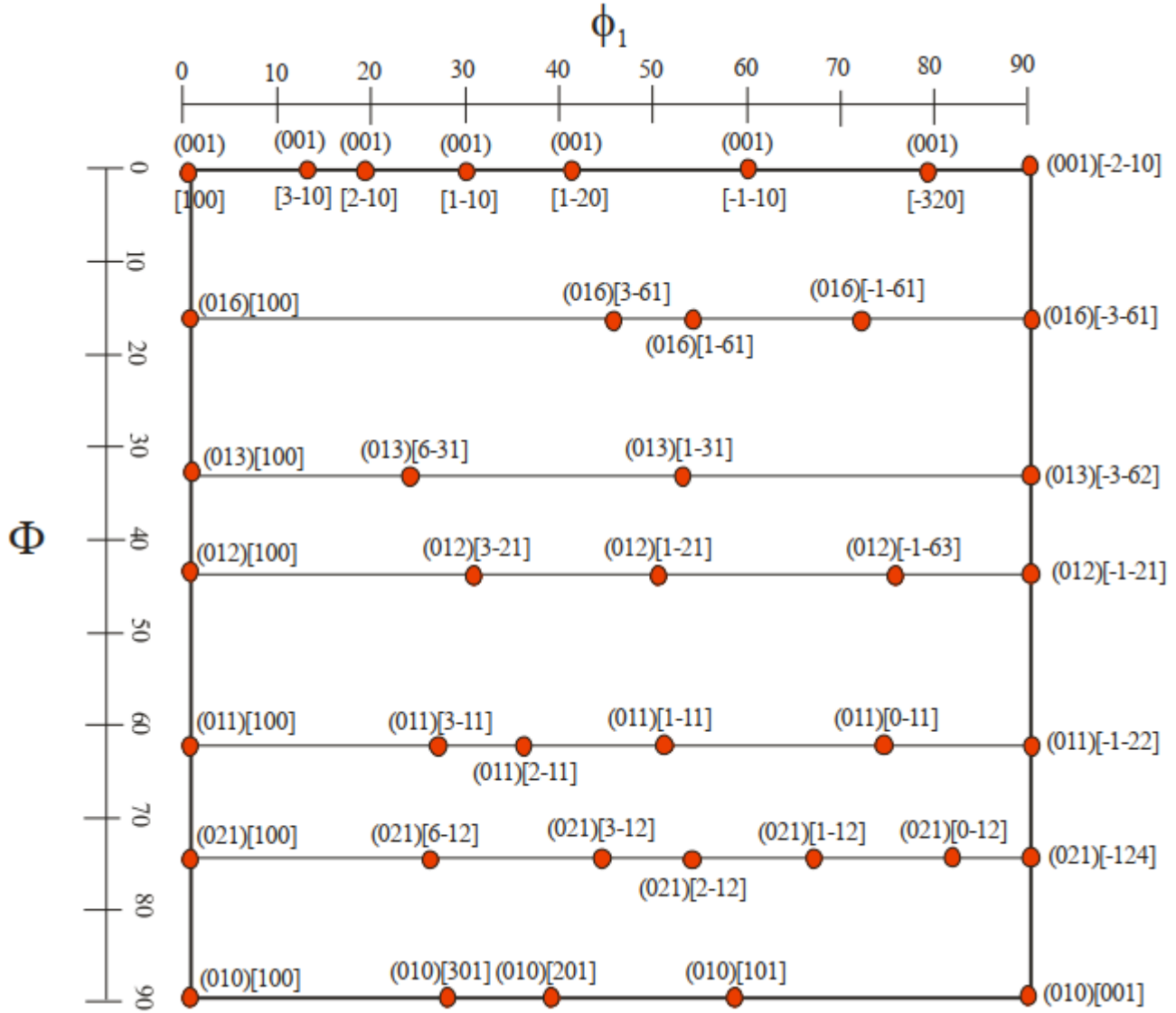
Magnesiumを例にA Type - B Type 比較

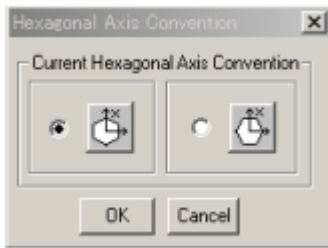


$\phi 2 = 0$ 断面

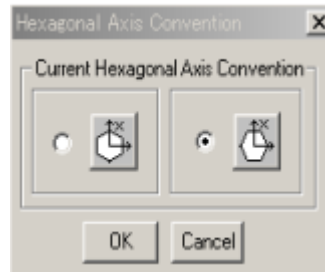


$\phi 2 = 30$ 断面

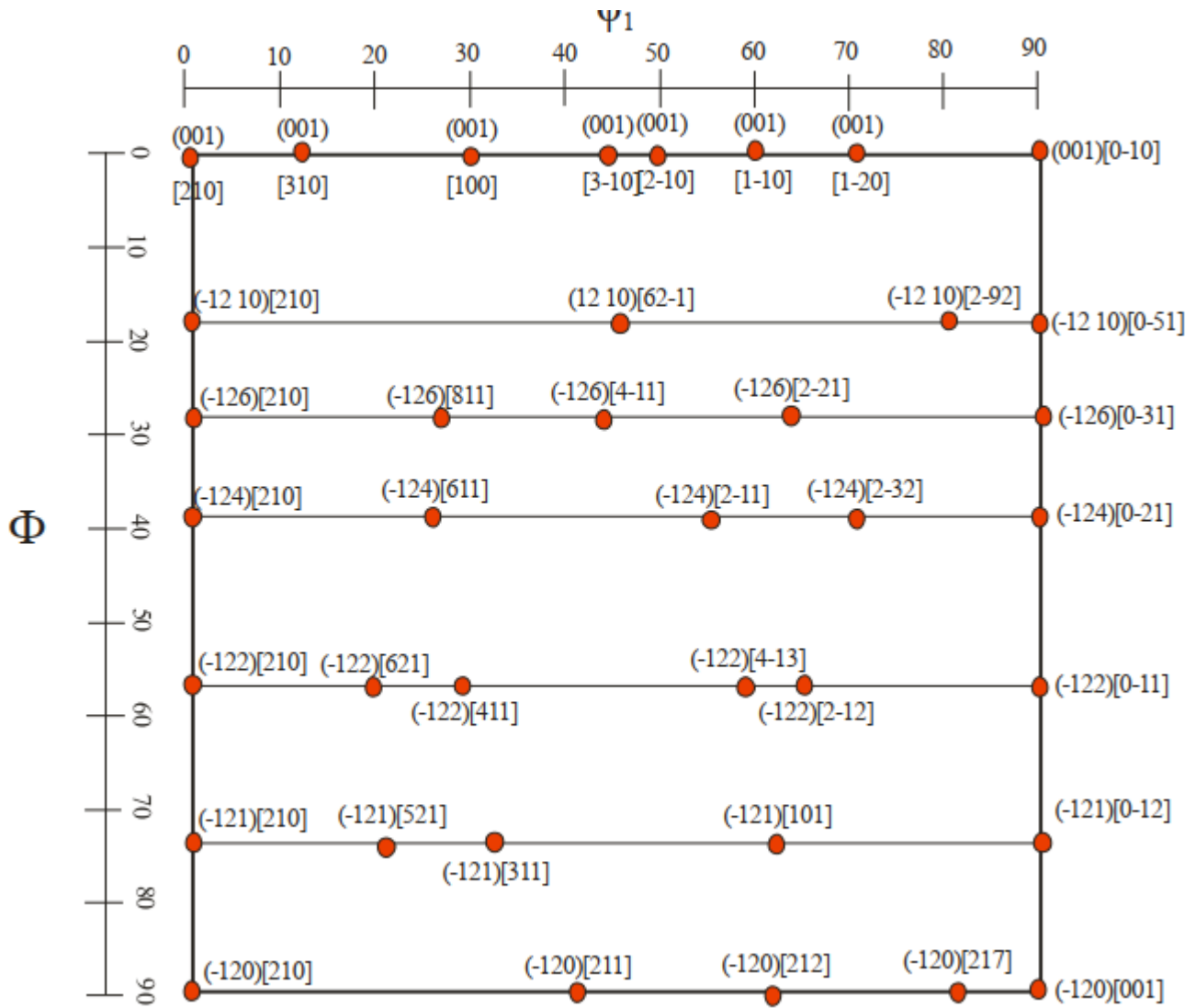




$\phi 2 = 30$ 断面

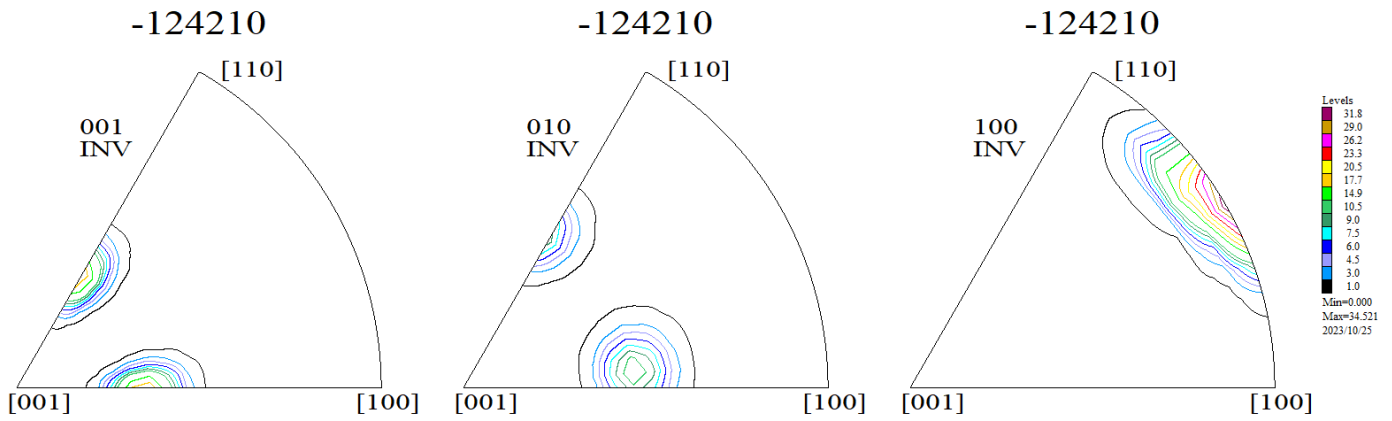


$\phi 2 = 0$ 断面

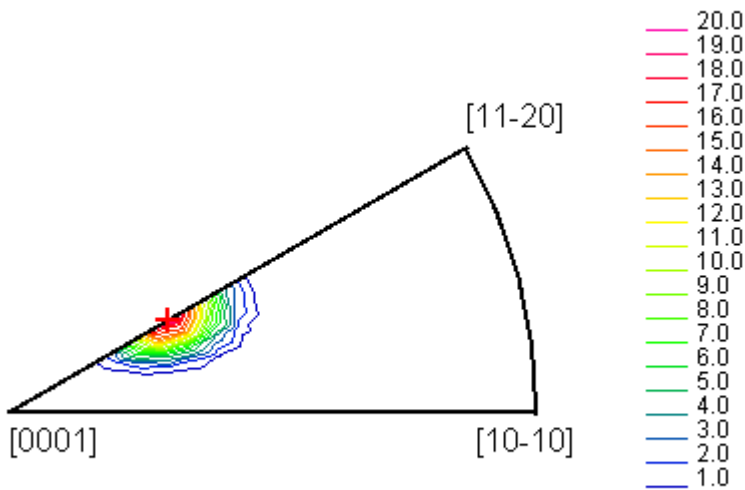


ODF解析後の逆極点図

LaboTex

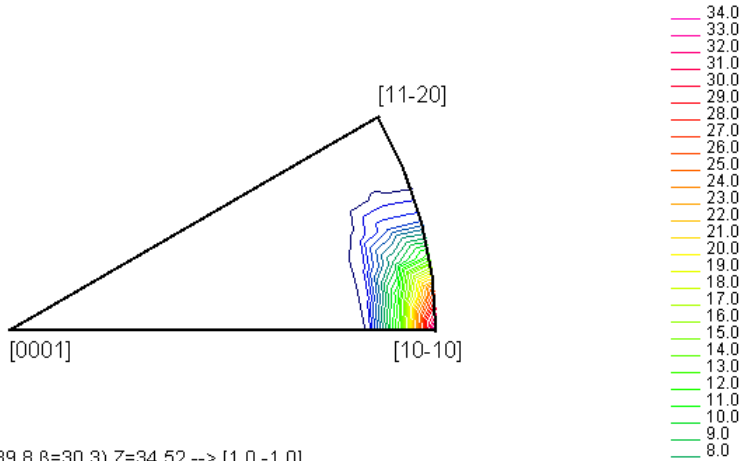


L:\Measure-Data\newODFVFChek-124210\LaboTex\C ND Max=20.18 Min=0.0



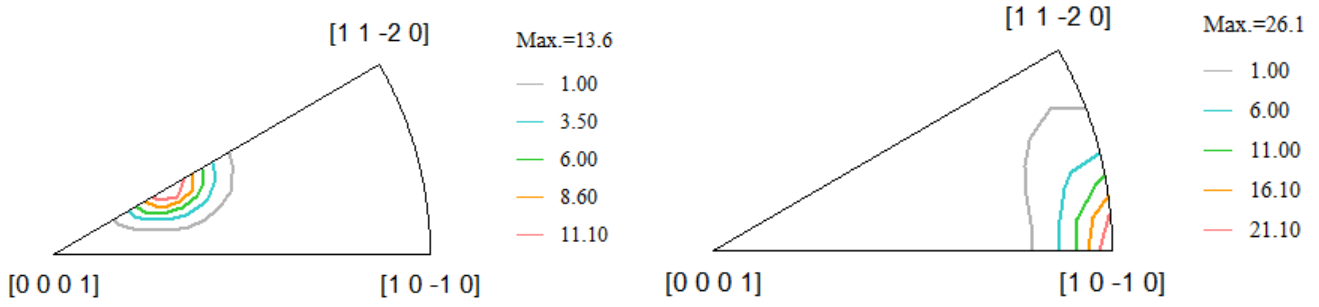
($\varphi=38.46$, $\beta=60.0$) $Z=20.18 \rightarrow (1, 1, -2, 4)$

L:\Measure-Data\newODFVFChek-124210\LaboTex\CWA-124210-inv.TI RD Max=34.52 Min=0.0



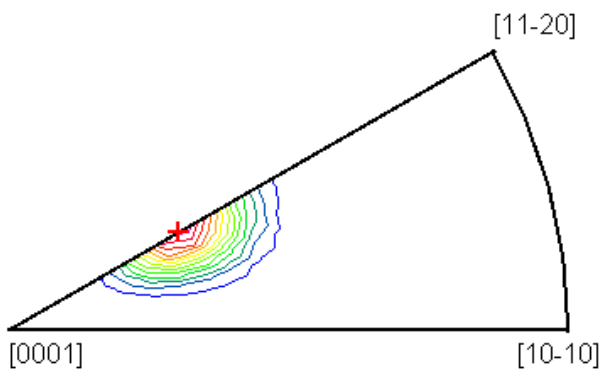
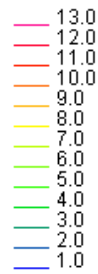
($\varphi=89.8$, $\beta=30.3$) $Z=34.52 \rightarrow (1, 0, -1, 0)$

TexTools



L:\Measure-Data\newODFVFChek-124210\TexTools\ND.HIPF
ND

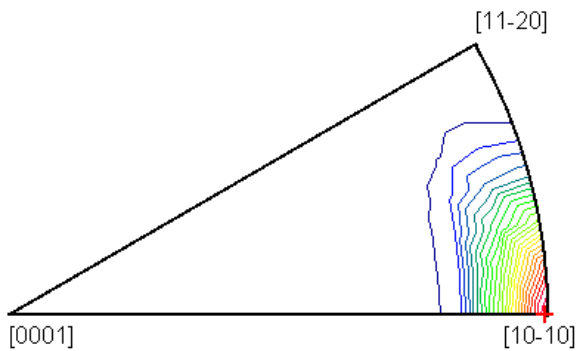
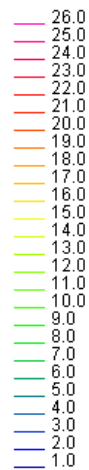
Max=13.6
Min=0.02



($\varphi=38.46$, $\beta=60.0$) Z=13.6 --> (1,1,-2,4)

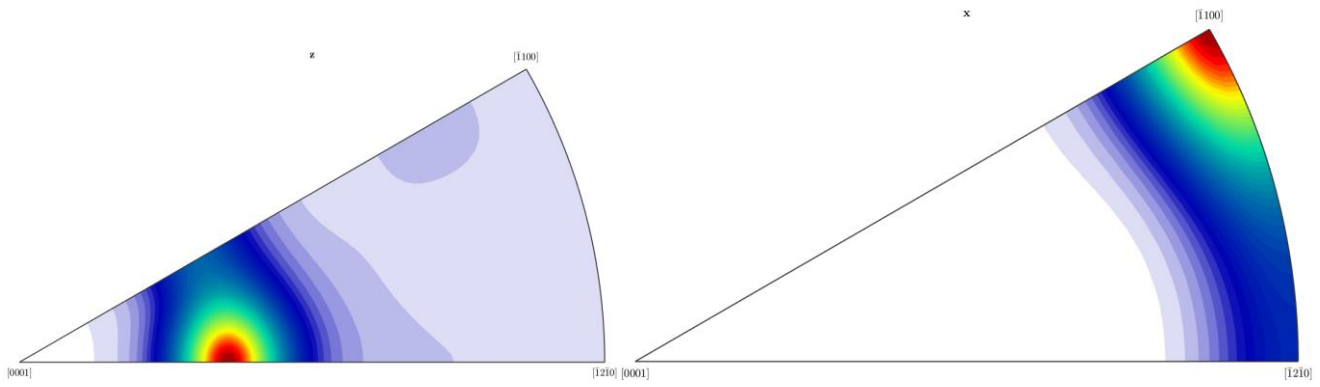
L:\Measure-Data\newODFVFChek-124210\TexTools\RD.HIPF
RD

Max=26.09
Min=0.03



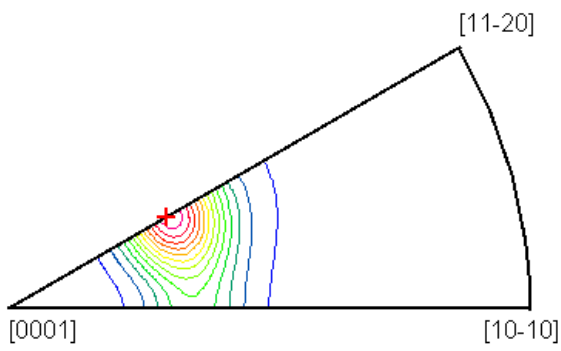
($\varphi=89.7$ $\beta=30.0$) Z=26.09 --> [1,0,-1,0]

MTEX



L:\Measure-Data\newODFVFChek-124210\MTEX\ND.TXT
ND

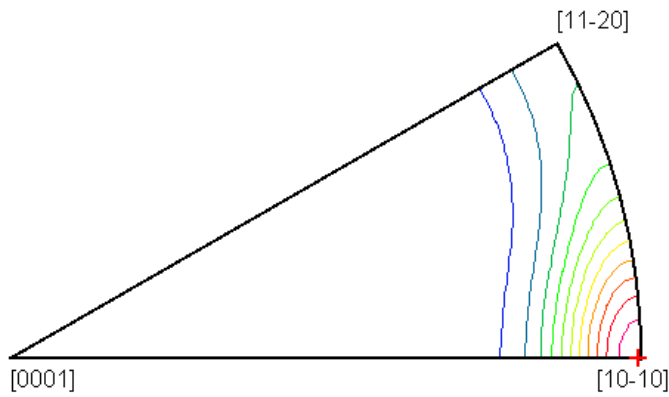
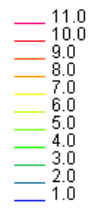
Max=6.86
Min=0.0



$(\varphi=38.46, \beta=60.0) Z=6.74 \rightarrow (1,1,-2,4)$

L:\Measure-Data\newODFVFChek-124210\MTEX\RD.TXT
RD

Max=11.79
Min=0.19

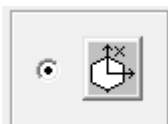
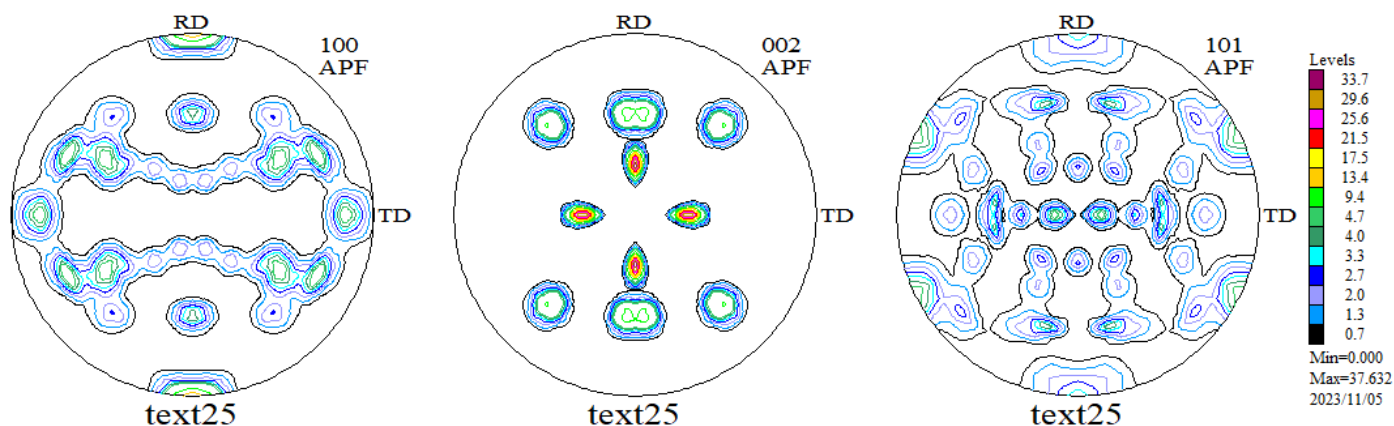


$(\varphi=89.7, \beta=30.1) Z=11.79 \rightarrow [1,0,-1,0]$

n e w O D F (S m a r t L a b)

他社と異なり、画像イメージ出力のため、対応できていません。

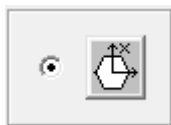
A-Type, B-TypeによるVolume Fraction
テストデータ



No	Texture Component	On	Distribution	FWHM ϕ_1	FWHM ϕ	FWHM ϕ_2	Volume Fraction	Show Sym. Eq.
1	{ 0 1 3 } < -3 -6 2 >	<input checked="" type="checkbox"/>	Gauss	10.0	10.0	10.0	25	{ 0 1 3 } < -3 -6 2 >
2	{ -1 2 5 } < 2 1 0 >	<input checked="" type="checkbox"/>	Gauss	10.7	10.0	10.0	27	%
3	{ 1 2 3 } < 1 1 -1 >	<input checked="" type="checkbox"/>	Gauss	10.0	10.0	10.1	22	%
4	{ 1 5 4 } < 1 -1 1 >	<input checked="" type="checkbox"/>	Gauss	10.1	10.0	10.3	26	%
5	{ 90., 54.74, 45. }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	2	%
6	{ 0., 35.26, 45. }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
7	{ 0., 25.24, 45. }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
8	{ 39.23, 65.91, 26.5 } copper	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
9	{ 74.21, 45., 90. }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
10	{ 27.03, 57.69, 18.43 }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%

Max. Linearity
 Orientation Set: Set from Database (sort by) Save Current Set Background: 0

Show Sym. Eq. { 0 1 3 } < -3 -6 2 >
 Calculation Mode: Automatic Manual
 Max. Iteration Number: 1,000
 Max. Fit Error % (*1000): 100
 Iteration: 1001
 Fit Error% (*1000): 4301.
 Fit Calculation Progress: [Progress Bar]



No	Texture Component	On	Distribution	FWHM ϕ_1	FWHM ϕ	FWHM ϕ_2	Volume Fraction	Show Sym. Eq.
1	{ 0 1 3 } < -3 -6 2 >	<input checked="" type="checkbox"/>	Gauss	10.0	10.0	10.0	25	{ 0 1 3 } < -3 -6 2 >
2	{ -1 2 5 } < 2 1 0 >	<input checked="" type="checkbox"/>	Gauss	10.0	10.0	10.0	25	%
3	{ 1 2 3 } < 1 1 -1 >	<input checked="" type="checkbox"/>	Gauss	10.2	10.3	10.4	23	%
4	{ 1 5 4 } < 1 -1 1 >	<input checked="" type="checkbox"/>	Gauss	10.4	10.4	10.4	27	%
5	{ 90., 54.74, 45. }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	2	%
6	{ 52.87, 74.5, 33.69 }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
7	{ 0.0, 45., 0. } goss	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
8	{ 0.0, 18.43, 0.0 }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
9	{ 39.23, 65.91, 26.5 } copper	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%
10	{ 0., 35.26, 45. }	<input type="checkbox"/>	Gauss	10.0	10.0	10.0	10	%

Max. Linearity
 Orientation Set: Set from Database (sort by) Save Current Set Background: 0

Show Sym. Eq. { 0 1 3 } < -3 -6 2 >
 Calculation Mode: Automatic Manual
 Max. Iteration Number: 1,000
 Max. Fit Error % (*1000): 100
 Iteration: 973
 Fit Error% (*1000): 2949.
 Fit Calculation Progress: [Progress Bar]

ほぼ同一結果