

V o l u m e F r a c t i o n と d e f o c u s

2025年05月18日

HelperTex Office

概要

V o l u m e F r a c t i o n や方位密度と d e f o c u s の関係を調べるため、
L a b o T e x の M o d e l O D F 機能を使い、各種方位極点図を作成し d e f o c u s との
関係を以下の手法で確かめてみます。

作成する極点図は

c u b e (4 0 %) + ?? 方位 (4 0 %) + r a n d o m (2 0 %)

完全極点図

反射極点図

d e f o c u s (軽度) 反射極点図

d e f o c u s (重度) 反射極点図

による V o l u m e F r a c t i o n の確認を行う。

軽度 d e f o c u s 計算

The screenshot shows the TenckhoffCalc 1.04S software interface. The 'MODE' dropdown is set to 'Maxsreach'. The 'TXT2File' section shows a file path: 'C:\CTR\DATA\Al-powder-random\111-random_S_chB00_2.TXT'. The 'TenckhoffParametor' section has the following values: 'beam width on sample(mm)' is 1.0, 'P' is 1 (circled in yellow), '2Theta angle(degree)' is 38.5, 'h,k,l' is 1,1,1, 'RSSlitSize(mm)' is 7, 'Alfa(degree) Start' is 0.0, 'Stop' is 75.0, and 'Step' is 5.0. The 'MakeFile(Optional)' section has 'TenckhoffFile' selected with a radio button. There are buttons for 'Calc', 'Fitting', and 'MakeFile(Optional)'.

重度 d e f o c u s 計算

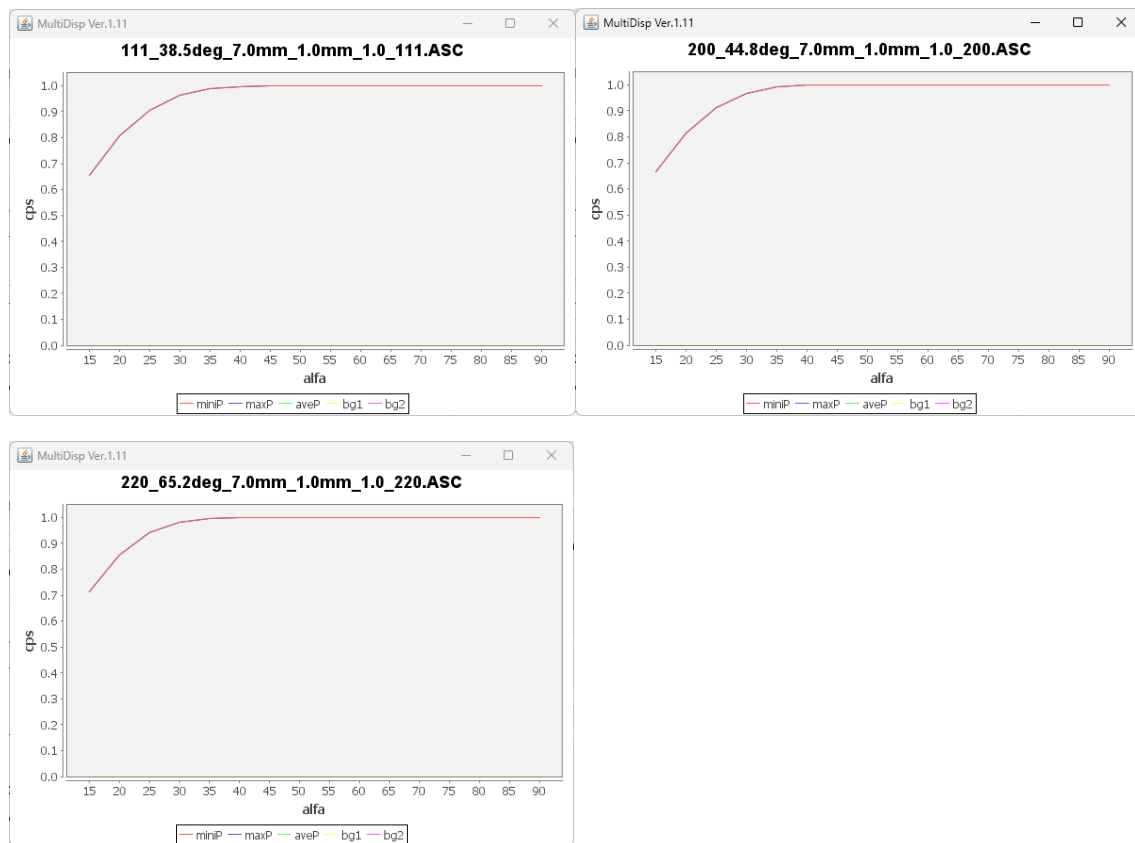
The screenshot shows the TenckhoffCalc 1.04S software interface. The 'MODE' dropdown is set to 'Maxsreach'. The 'TXT2File' section shows a file path: 'C:\CTR\DATA\Al-powder-random\111-random_S_chB00_2.TXT'. The 'TenckhoffParametor' section has the following values: 'beam width on sample(mm)' is 1.0, 'P' is 2 (circled in yellow), '2Theta angle(degree)' is 38.5, 'h,k,l' is 1,1,1, 'RSSlitSize(mm)' is 7, 'Alfa(degree) Start' is 0.0, 'Stop' is 75.0, and 'Step' is 5.0. The 'MakeFile(Optional)' section has 'TenckhoffFile' selected with a radio button. There are buttons for 'Calc', 'Fitting', and 'MakeFile(Optional)'.

2 θ 角度を変更し各指数 d e f o c u s を作成

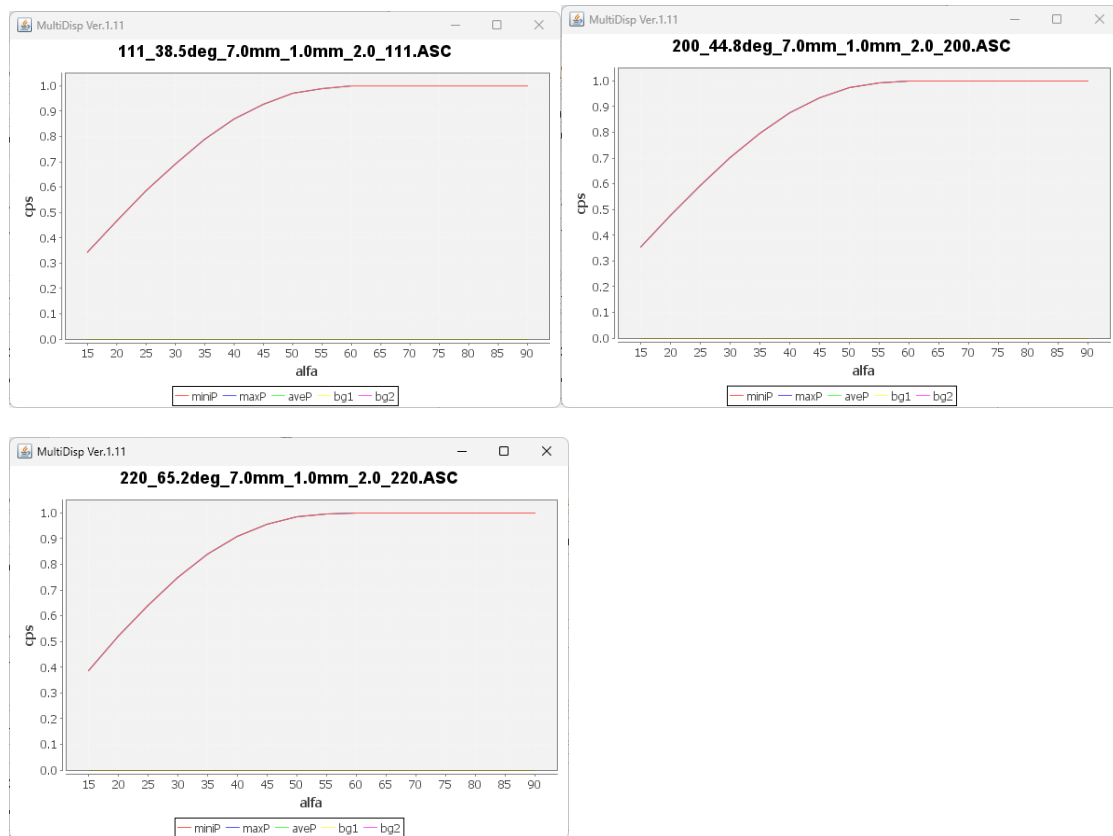
holder:VF

作成されたdefocus極点図

right

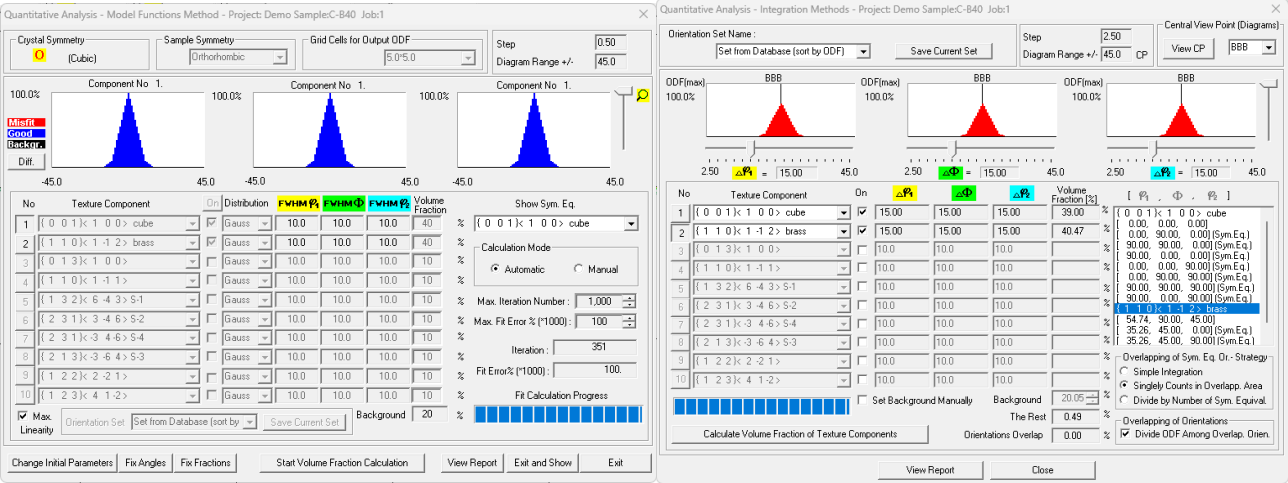


heavy



cube+brass

完全極点図

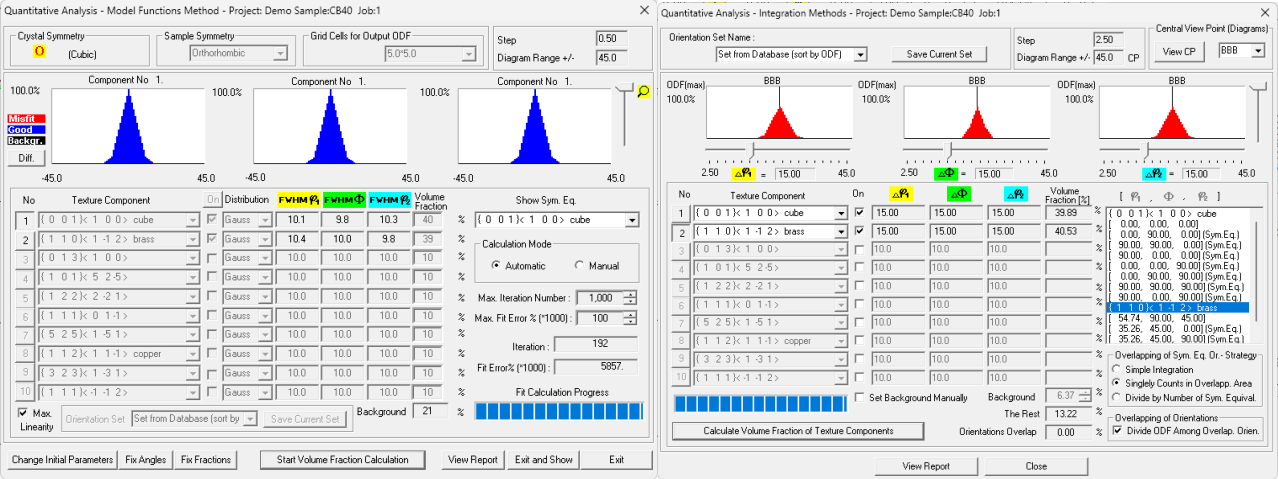


Component No 1 - Distribution :Gauss					
39.97	10.0	10.0	10.0	{ 0 0 1 } < 1 0 0 >	cube
Component No 2 - Distribution :Gauss					
40.03	10.0	10.0	10.0	{ 1 1 0 } < 1 -1 2 >	brass
20.00 Background Volume Fraction					

39.00	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 >	cube
40.47	15.00	15.00	15.00	{ 1 1 0 } < 1 -1 2 >	brass
20.05 Background Volume Fraction					

不完全極点図

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	64	178	0.54	0.39
3	66	180	0.54	0.39
3	69	183	0.54	0.39
END OF ODF CALCULATION				

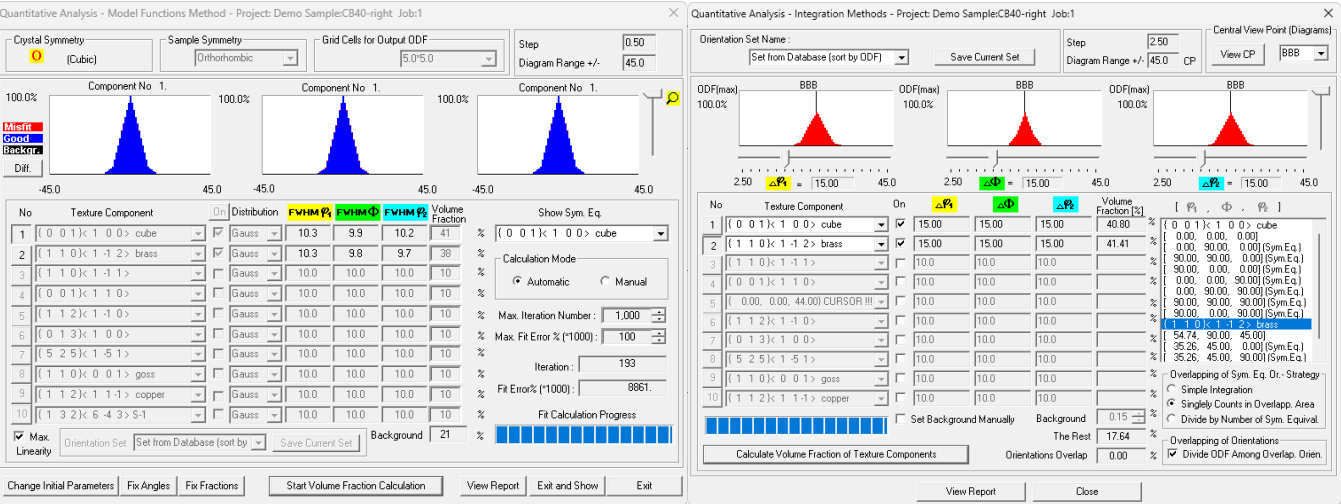


Component No 1 - Distribution :Gauss					
39.77	10.1	9.8	10.3	{ 0 0 1 } < 1 0 0 >	cube
Component No 2 - Distribution :Gauss					
39.38	10.4	10.0	9.8	{ 1 1 0 } < 1 -1 2 >	brass
20.85 Background Volume Fraction					

39.89	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 >	cube
40.53	15.00	15.00	15.00	{ 1 1 0 } < 1 -1 2 >	brass
6.37 Background Volume Fraction					

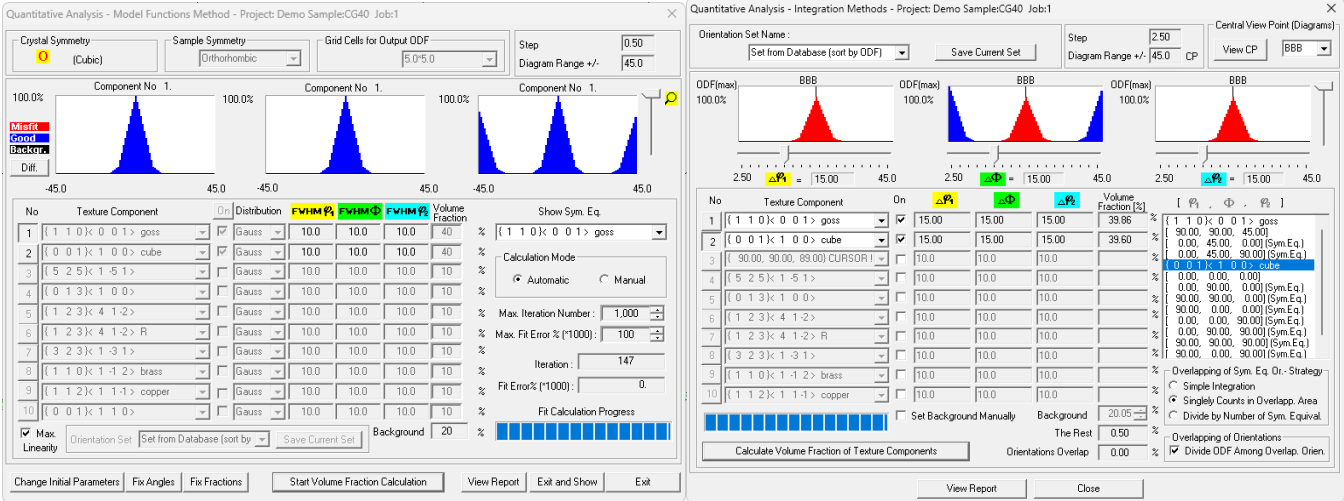
defocus-right

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	70	151	6.20	0.12



cube + goss

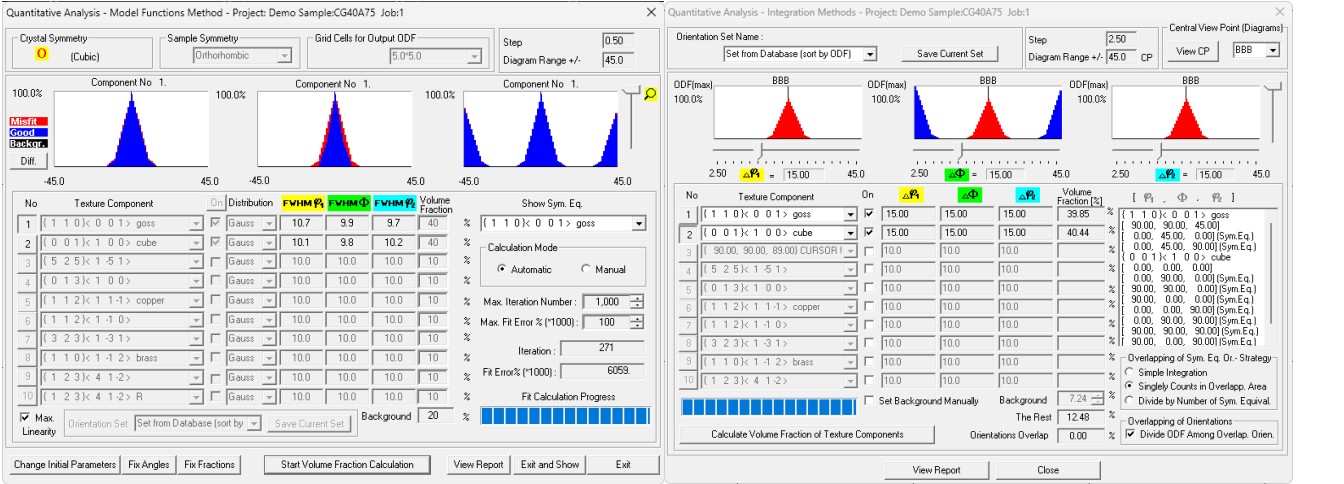
完全極点図



Component No 1 - Distribution :Gauss									
40.00	10.0	10.0	10.0	{ 1 1 0 } < 0 0 1 > goss	39.86	15.00	15.00	15.00	{ 1 1 0 } < 0 0 1 > goss
Component No 2 - Distribution :Gauss									
40.00	10.0	10.0	10.0	{ 0 0 1 } < 1 0 0 > cube	39.60	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
20.00 Background Volume Fraction					20.05 Background Volume Fraction				

反射極点図

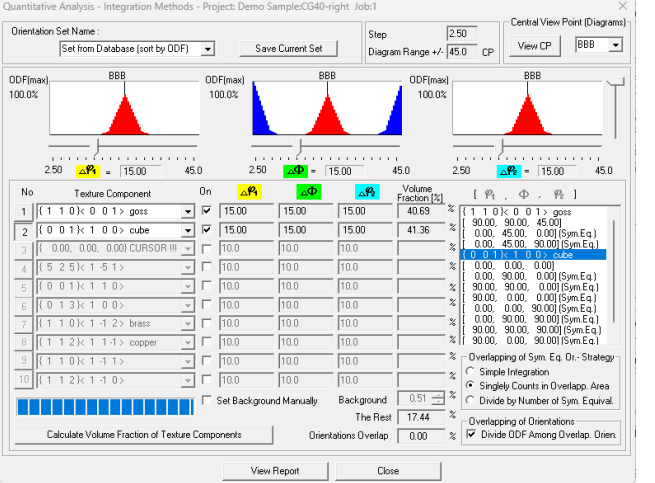
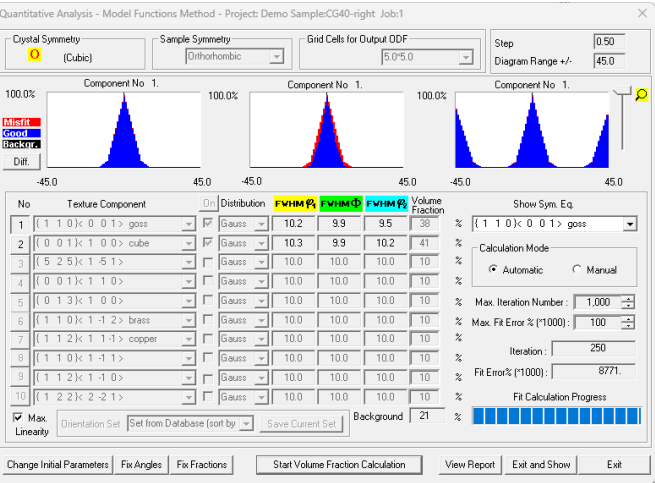
Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	55	174	0.60	0.39
3	57	176	0.60	0.39
3	69	188	0.60	0.39
END OF ODF CALCULATION				



Component No 1 - Distribution :Gauss									
39.65	10.7	9.9	9.7	{ 1 1 0 } < 0 0 1 > goss	39.85	15.00	15.00	15.00	{ 1 1 0 } < 0 0 1 > goss
Component No 2 - Distribution :Gauss									
39.51	10.1	9.8	10.2	{ 0 0 1 } < 1 0 0 > cube	40.44	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
20.85 Background Volume Fraction					7.24 Background Volume Fraction				

defocus-right

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	70	150	6.22	0.10
END OF ODF CALCULATION				

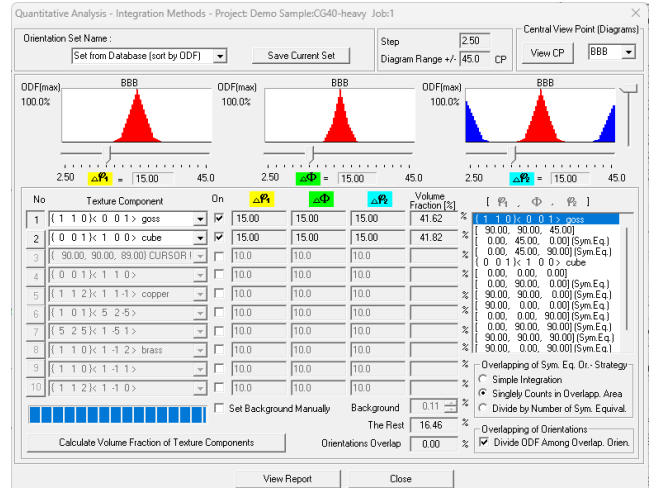
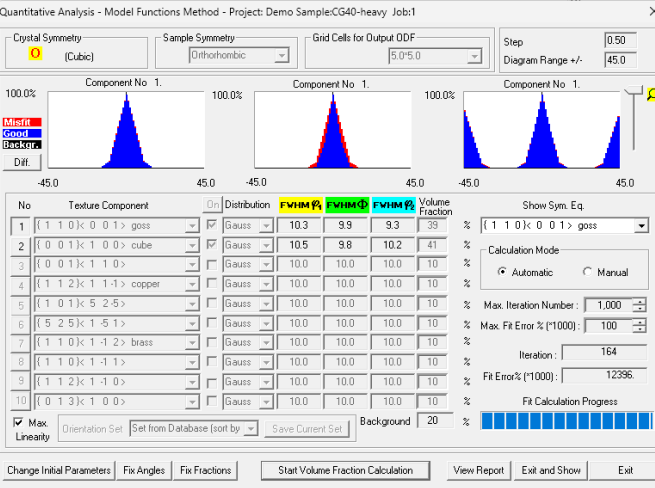


Component No 1 - Distribution :Gauss	38.00	10.2	9.9	9.5	{ 1 1 0 } < 0 0 1 > goss
Component No 2 - Distribution :Gauss	40.77	10.3	9.9	10.2	{ 0 0 1 } < 1 0 0 > cube
21.23	Background Volume Fraction				

40.69	15.00	15.00	15.00	{ 1 1 0 } < 0 0 1 > goss
41.36	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
0.51	Background Volume Fraction			
17.44	The Rest Volume Fraction			
0.00	Orientations Overlap Volume Fraction			

defocus-heavy

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	21	63	22.67	0.10
END OF ODF CALCULATION				

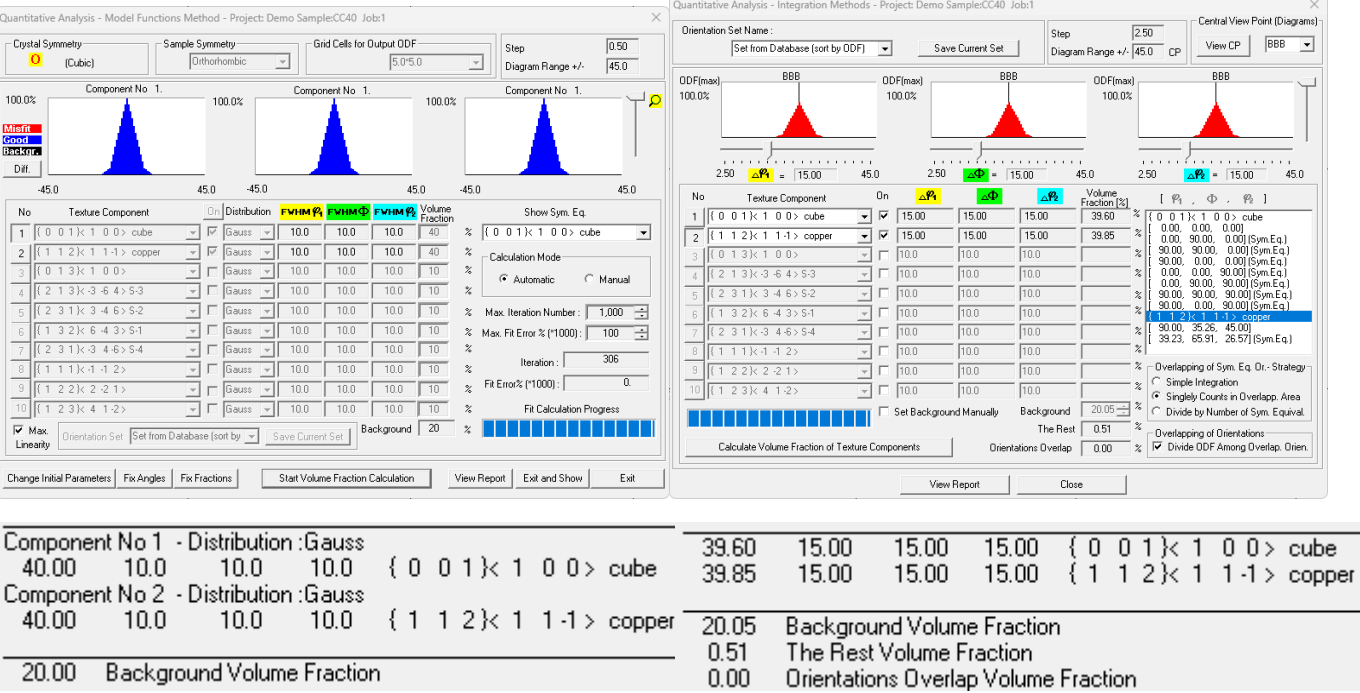


Component No 1 - Distribution :Gauss	38.87	10.3	9.9	9.3	{ 1 1 0 } < 0 0 1 > goss
Component No 2 - Distribution :Gauss	40.67	10.5	9.8	10.2	{ 0 0 1 } < 1 0 0 > cube
20.46	Background Volume Fraction				

41.62	15.00	15.00	15.00	{ 1 1 0 } < 0 0 1 > goss
41.82	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
0.11	Background Volume Fraction			
16.46	The Rest Volume Fraction			
0.00	Orientations Overlap Volume Fraction			

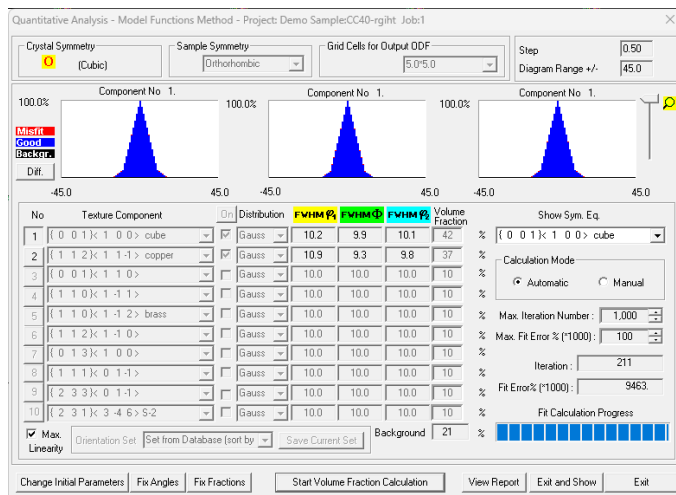
cube+copper

完全極点図

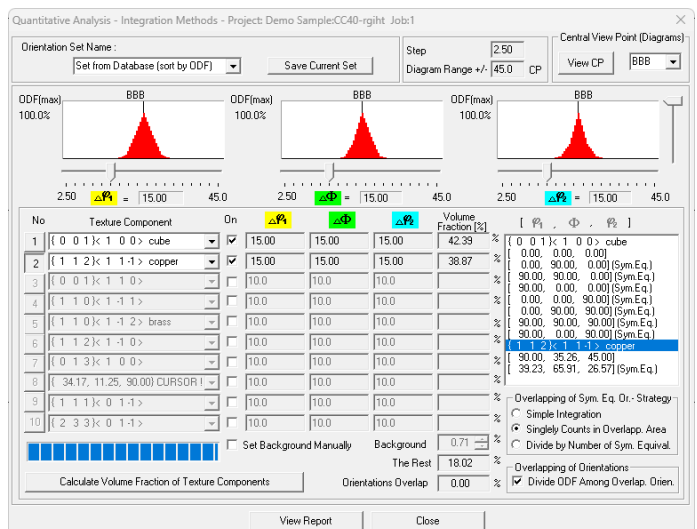


CC40 d e f o c u s - r i g h t

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	50	128	7.43	0.10



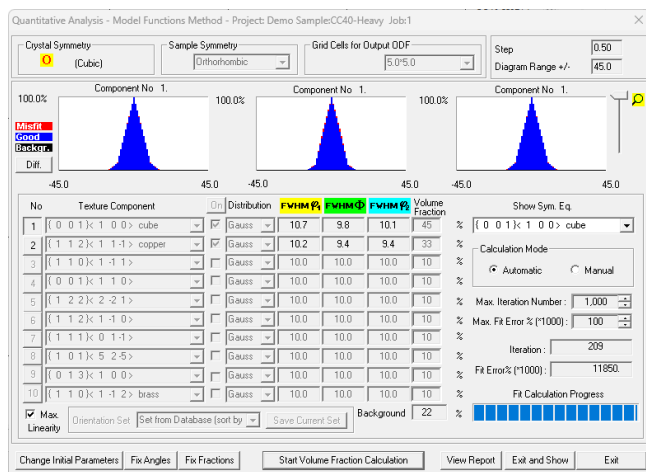
Component No 1 - Distribution :Gauss	41.74	10.2	9.9	10.1	{ 0 0 1 } < 1 0 0 > cube
Component No 2 - Distribution :Gauss	37.03	10.9	9.3	9.8	{ 1 1 2 } < 1 1 - 1 > copper
21.23	Background Volume Fraction				



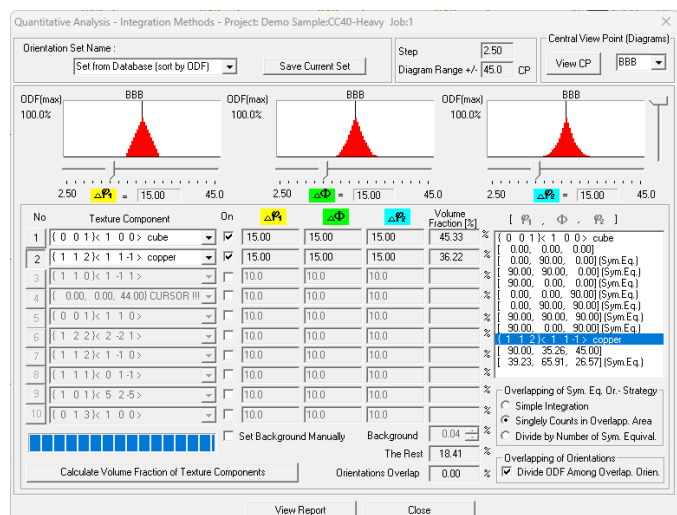
42.39	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
38.87	15.00	15.00	15.00	{ 1 1 2 } < 1 1 - 1 > copper
0.71	Background Volume Fraction			
18.02	The Rest Volume Fraction			
0.00	Orientations Overlap Volume Fraction			

CC40 d e f o c u s - H e a v y

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	6	45	22.81	0.07

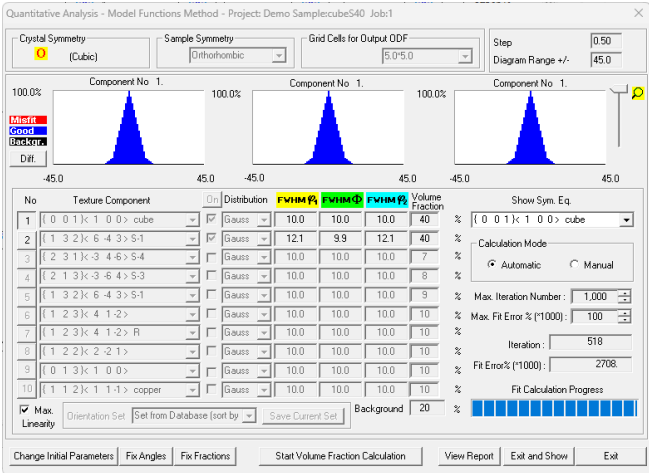


Component No 1 - Distribution :Gauss	44.70	10.7	9.8	10.1	{ 0 0 1 } < 1 0 0 > cube
Component No 2 - Distribution :Gauss	33.19	10.2	9.4	9.4	{ 1 1 2 } < 1 1 - 1 > copper
22.11	Background Volume Fraction				



44.70	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
33.19	15.00	15.00	15.00	{ 1 1 2 } < 1 1 - 1 > copper
0.04	Background Volume Fraction			
18.41	The Rest Volume Fraction			
0.00	Orientations Overlap Volume Fraction			

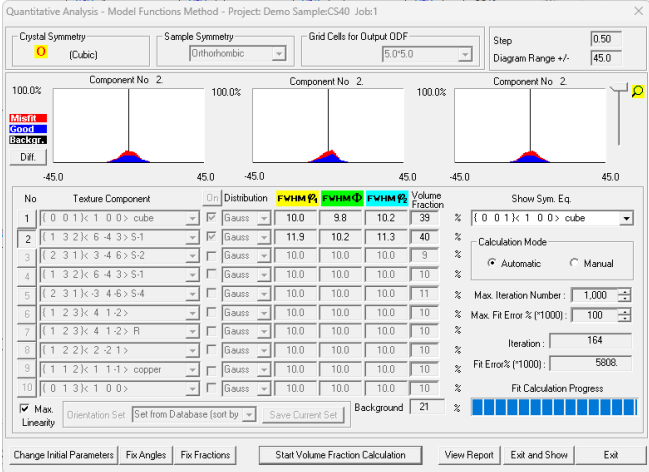
cube-S



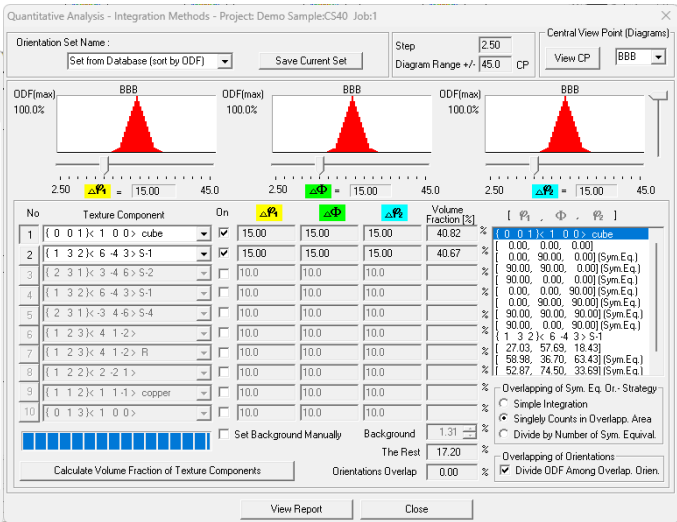
Component No 1 - Distribution :Gauss							
39.99	10.0	10.0	10.0	{ 0 0 1 } < 1 0 0 >	cube		
Component No 2 - Distribution :Gauss							
39.98	12.1	9.9	12.1	{ 1 3 2 } < 6 -4 3 >	S-1		
20.03	Background Volume Fraction						

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	67	175	0.69	0.52
3	68	176	0.69	0.52

FIND OF ODF CALIBRATION

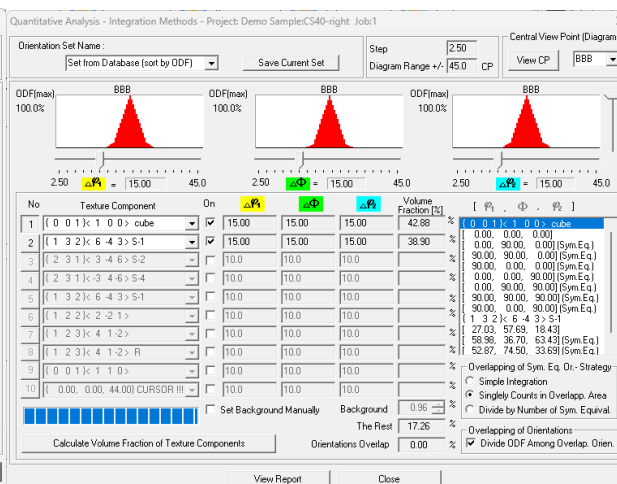
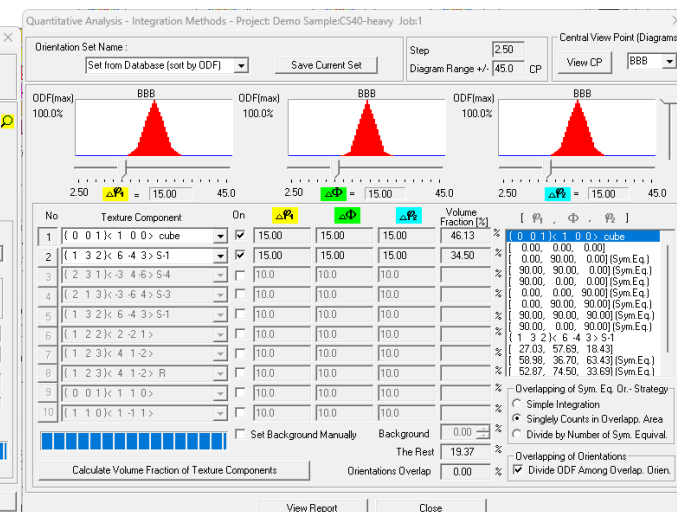
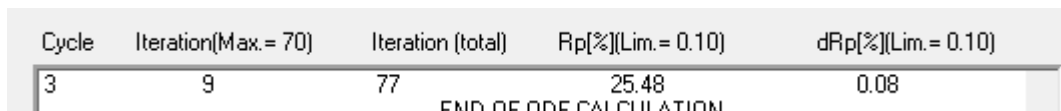


Component No 1 - Distribution :Gauss							
39.41	10.0	9.8	10.2	{ 0 0 1 } < 1 0 0 >	cube		
Component No 2 - Distribution :Gauss							
40.12	11.9	10.2	11.3	{ 1 3 2 } < 6 -4 3 >	S-1		
20.46	Background Volume Fraction						



40.82	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 >	cube
40.67	15.00	15.00	15.00	{ 1 3 2 } < 6 -4 3 >	S-1
1.31	Background Volume Fraction				
17.20	The Rest Volume Fraction				
0.00	Orientations Overlap Volume Fraction				

Cycle	Iteration(Max. = 70)	Iteration (total)	Rp[%](Lim. = 0.10)	dRp[%](Lim. = 0.10)
3	20	98	8.00	0.09

CS-40-heavy

Volume Fraction	Delta Phi1	Delta Phi	Delta Phi2	Orientation
46.13	15.00	15.00	15.00	{ 0 0 1 } < 1 0 0 > cube
34.50	15.00	15.00	15.00	{ 1 3 2 } < 6 -4 3 > S-1
0.00	Background Volume Fraction			
19.37	The Rest Volume Fraction			
0.00	Orientations Overlap Volume Fraction			

まとめ

		不完全極点		def-right		def-heavy	
		Function	Box	Function	Box	Function	Box
cube-brass	dRp%	0.54		6.20		22.58	
	cube	39.77	39.89	40.80	40.80	41.17	41.24
	brass	39.38	40.53	38.09	41.41	39.89	42.34
	back	20.85	6.37	21.11	0.15	18.94	0.09
	rest	13.21		17.64		16.33	
cube-goss	dRp%	0.60		6.22		22.67	
	cube	39.65	39.85	38.00	40.69	38.87	41.62
	goss	39.51	40.44	40.77	41.36	40.67	41.82
	back	20.85	7.24	21.23	0.51	20.46	0.11
	rest	12.47		17.44		16.46	
cube-copper	dRp%	0.56		7.43		22.81	
	cube	39.83	40.33	41.74	42.39	44.70	45.33
	copper	39.82	39.46	37.03	38.87	33.19	36.22
	back	20.35	8.76	21.23	0.71	22.11	0.04
	rest	11.44		18.02		18.41	
cube-S	dRp%	0.69		8.00		25.48	
	cube	39.41	40.82	42.85	42.88	50.51	46.13
	S	40.12	40.67	34.42	38.90	30.06	34.50
	back	20.46	1.31	22.74	0.96	19.43	0.00
	rest	17.20		17.26		19.37	

defocusの影響はcubeに対し、gossは増し、brass, copper, Sは減少傾向が認められる。

cube : goss : brass : copper : S = 4 : 4 : 2 : 2 : 1の大小関係に相関している。