Fig. 1

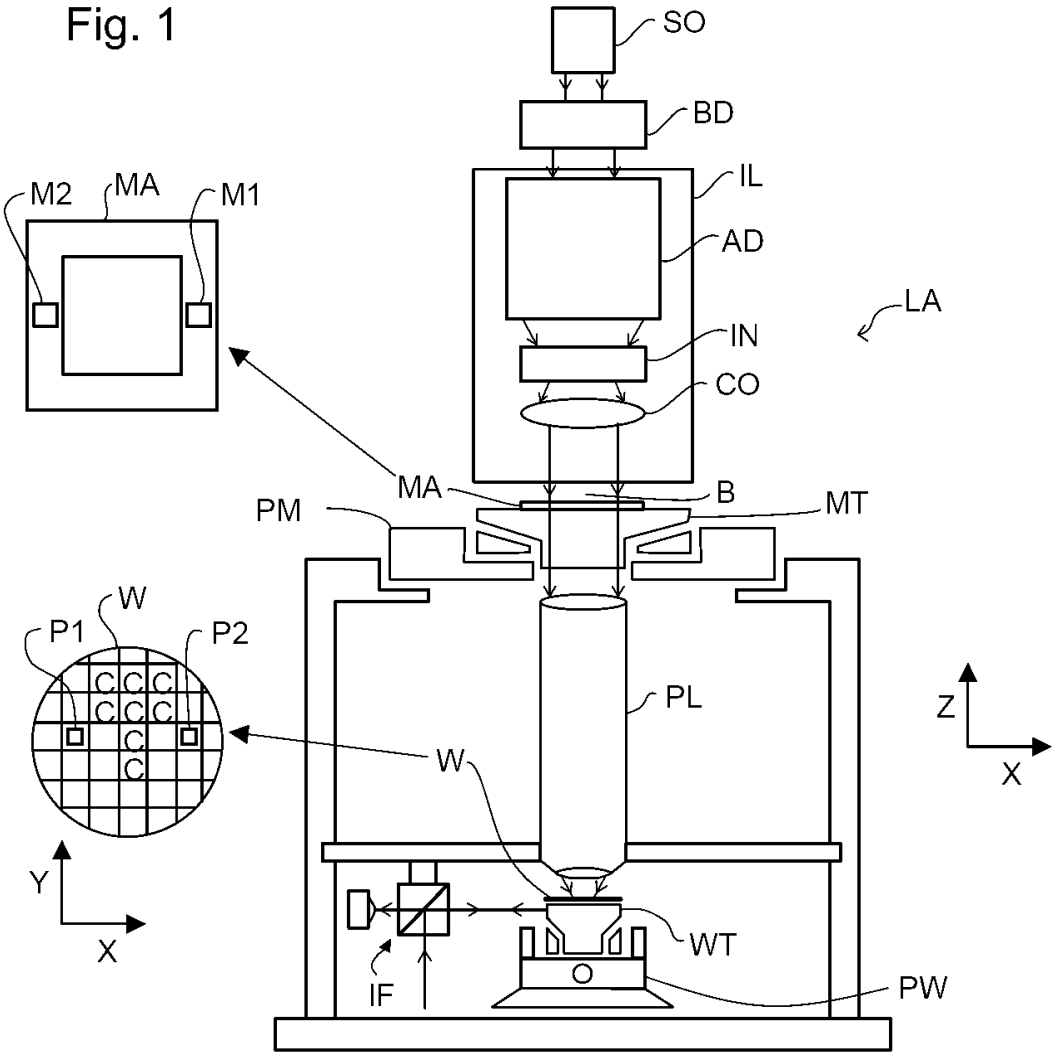

SO
BD
IL
AD
LA
IN
CO
M2
MA
M1
MA
B
MT
PM
W
P1
P2
PL
Z
X
W
Y
X
WT
IF
PW

Fig. 2

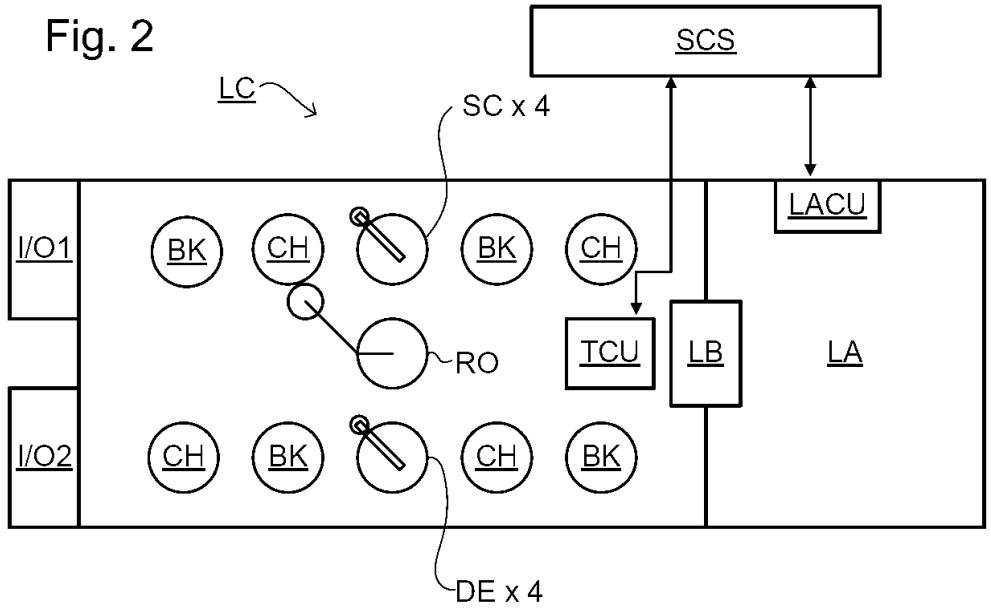

SCS
LC
SC x 4
LACU
I/O1
BK
CH
BK
CH
RO
TCU
LB
LA
I/O2
CH
BK
CH
BK
DE x 4

Fig. 3

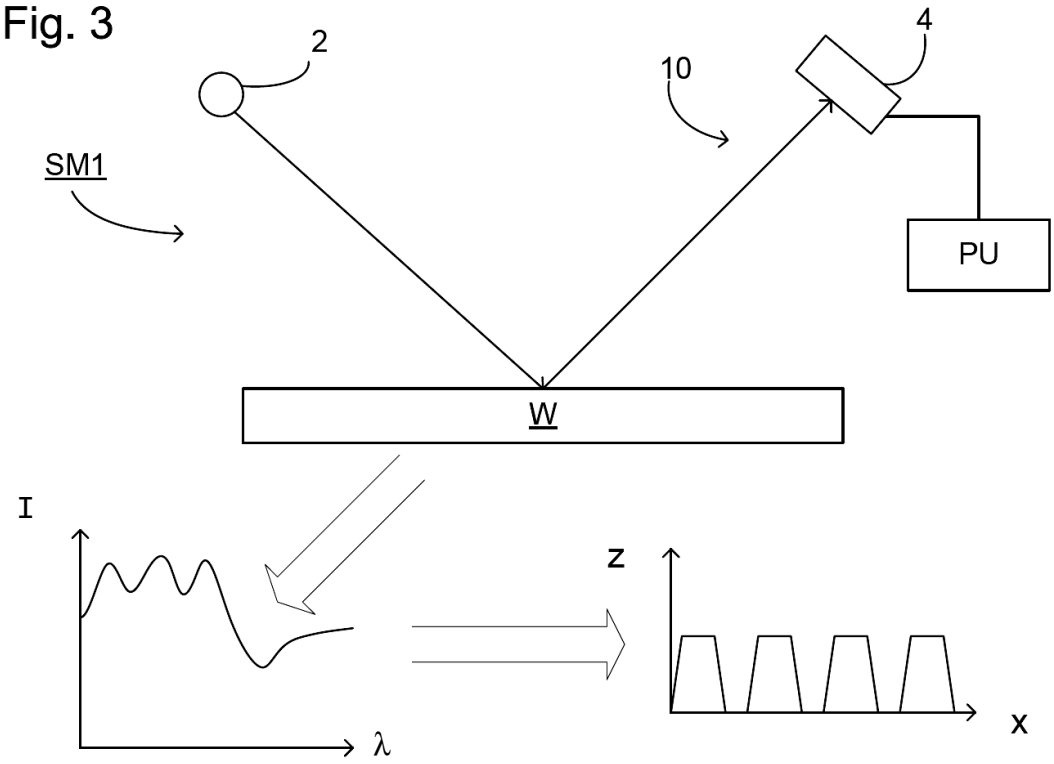
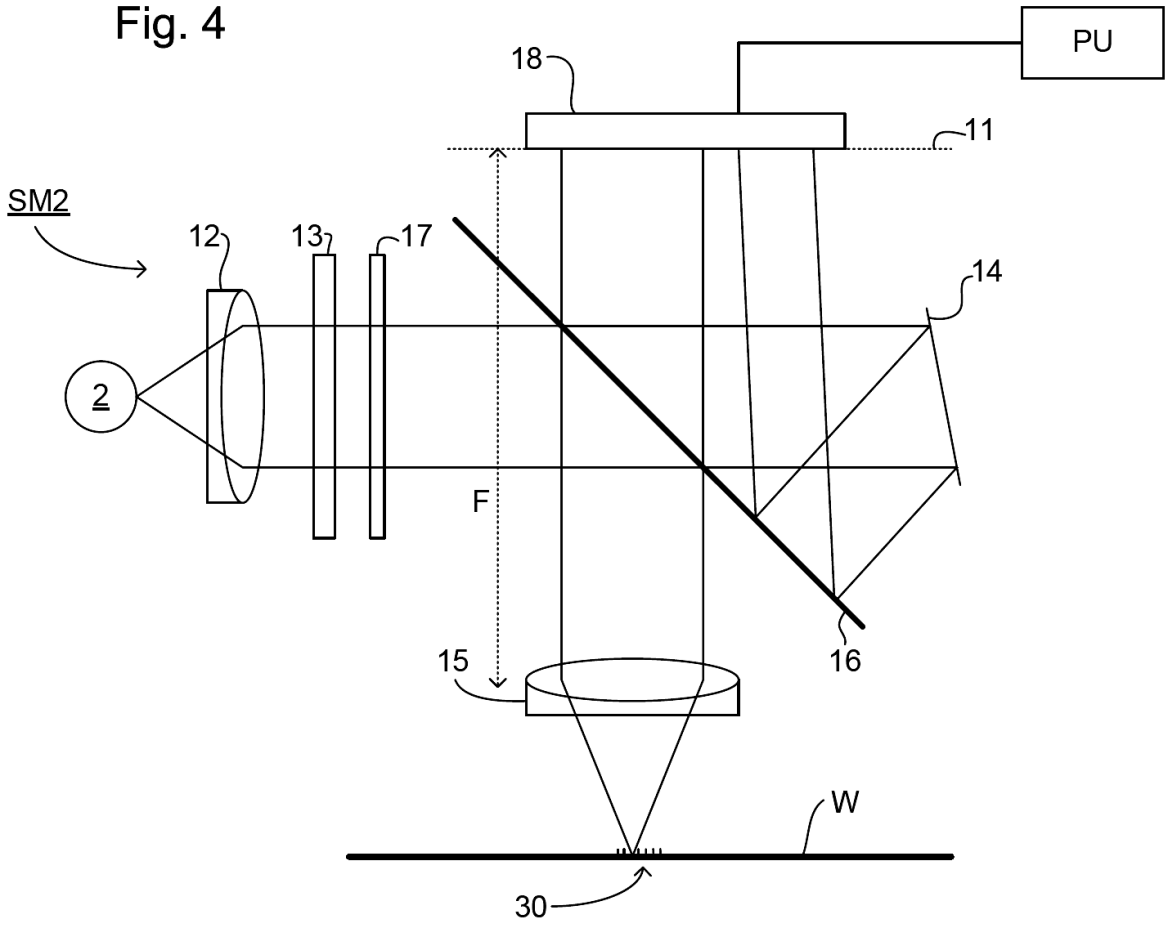


Fig. 4



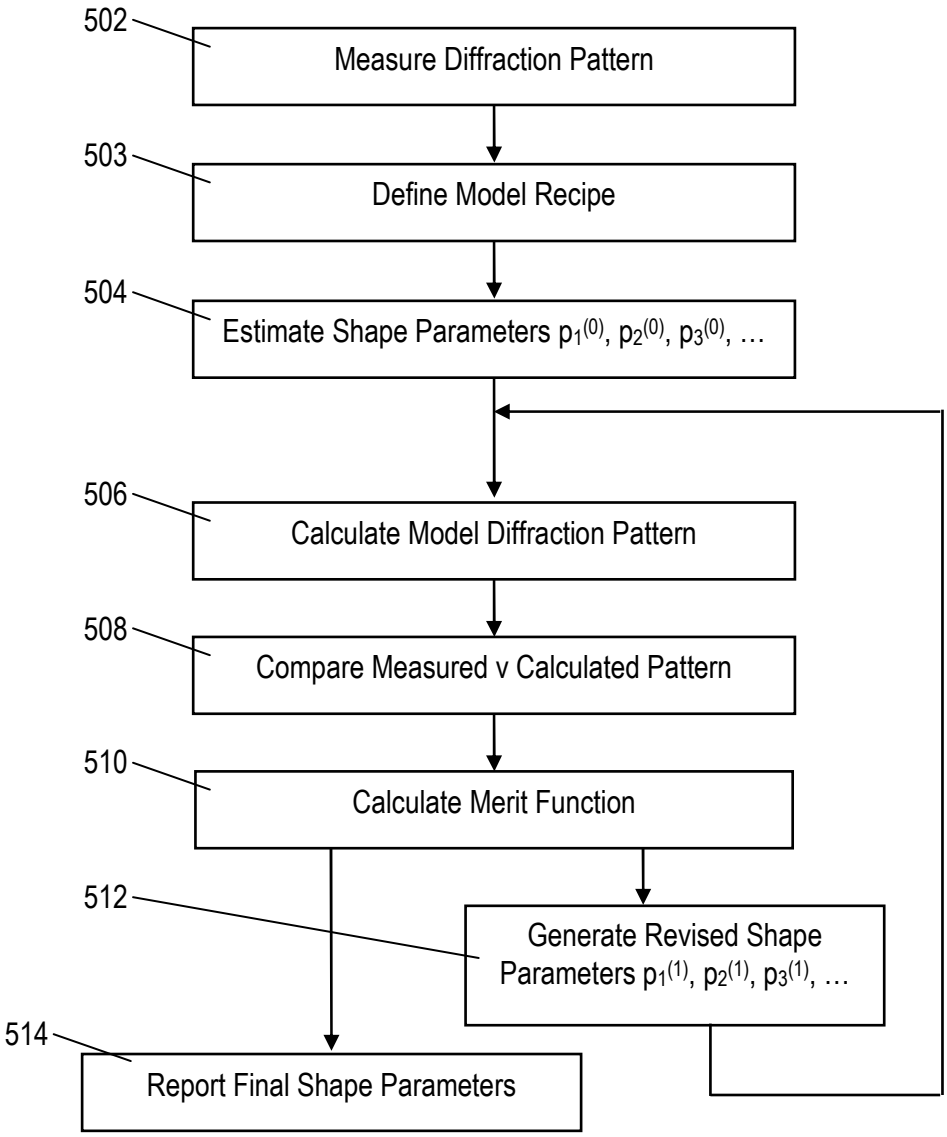

502
Measure Diffraction Pattern
503
Define Model Recipe
504
Estimate Shape Parameters $p_1^{(0)}$, $p_2^{(0)}$, $p_3^{(0)}$, …
506
Calculate Model Diffraction Pattern
508
Compare Measured v Calculated Pattern
510
Calculate Merit Function
512
Generate Revised Shape Parameters $p_1^{(1)}$, $p_2^{(1)}$, $p_3^{(1)}$, …
514
Report Final Shape Parameters

Fig. 5

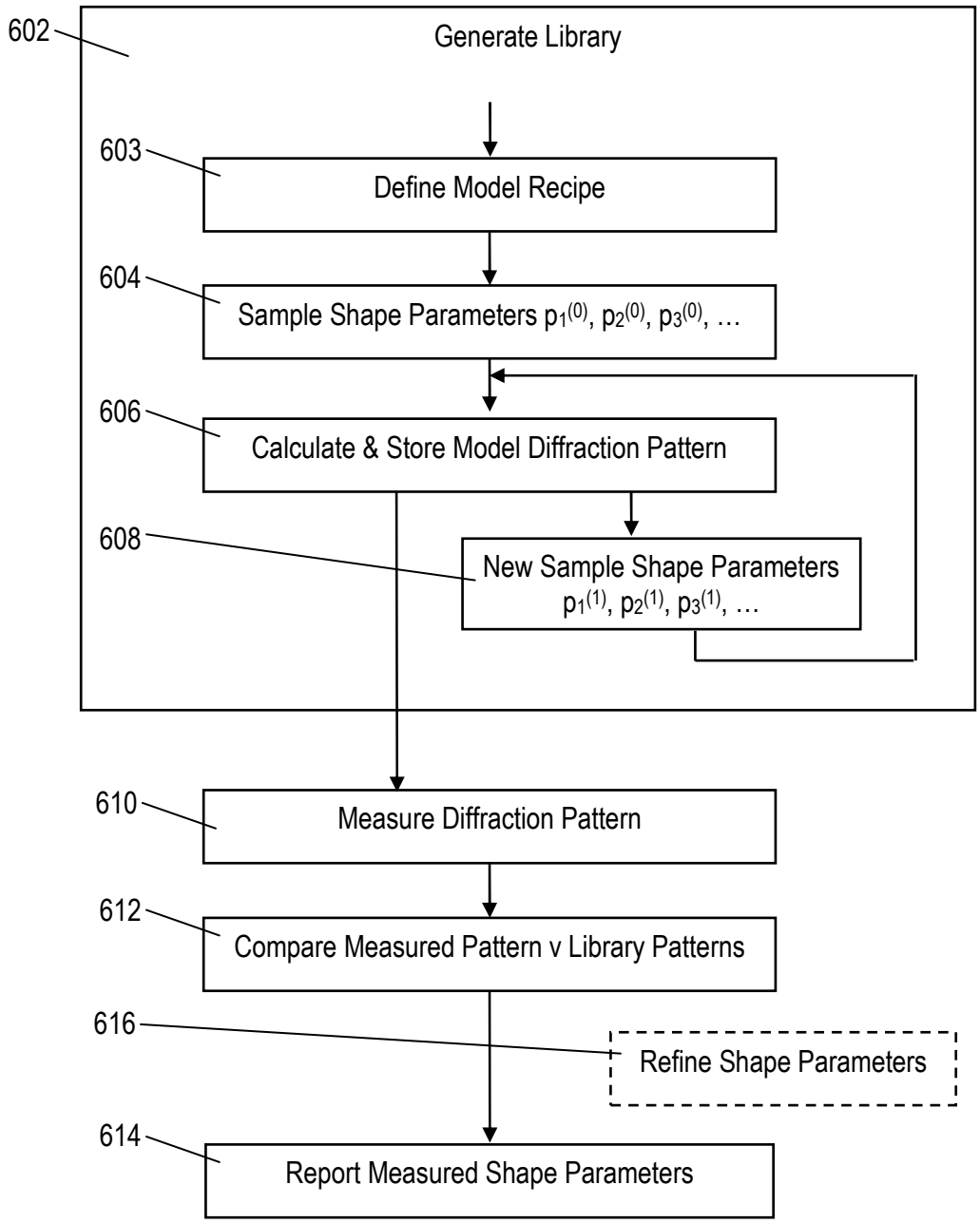

602
Generate Library
603
Define Model Recipe
604
Sample Shape Parameters $p_1^{(0)}$, $p_2^{(0)}$, $p_3^{(0)}$, …
606
Calculate & Store Model Diffraction Pattern
608
New Sample Shape Parameters
$p_1^{(1)}$, $p_2^{(1)}$, $p_3^{(1)}$, …
610
Measure Diffraction Pattern
612
Compare Measured Pattern v Library Patterns
616
Refine Shape Parameters
614
Report Measured Shape Parameters

Fig. 6

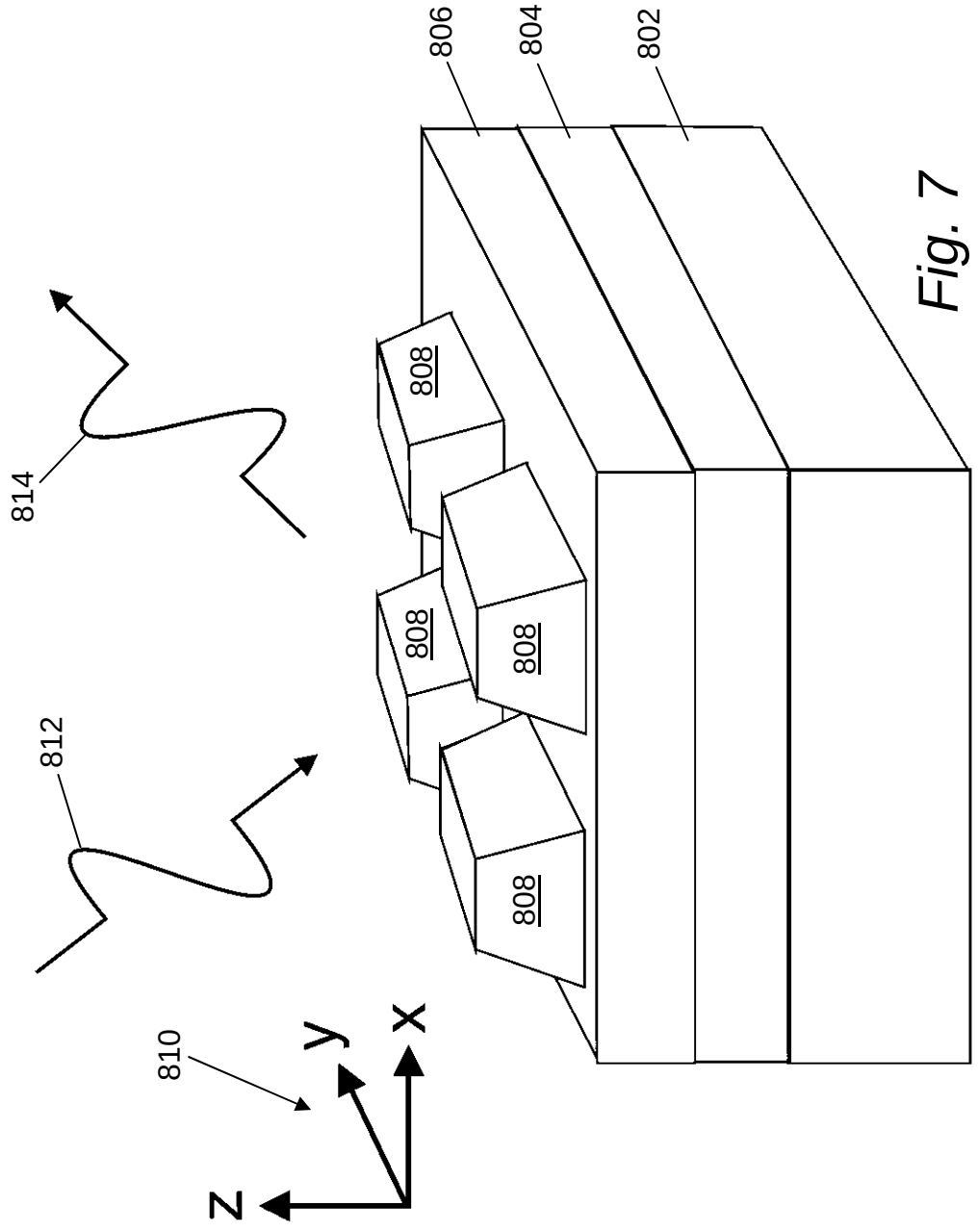


Fig. 7

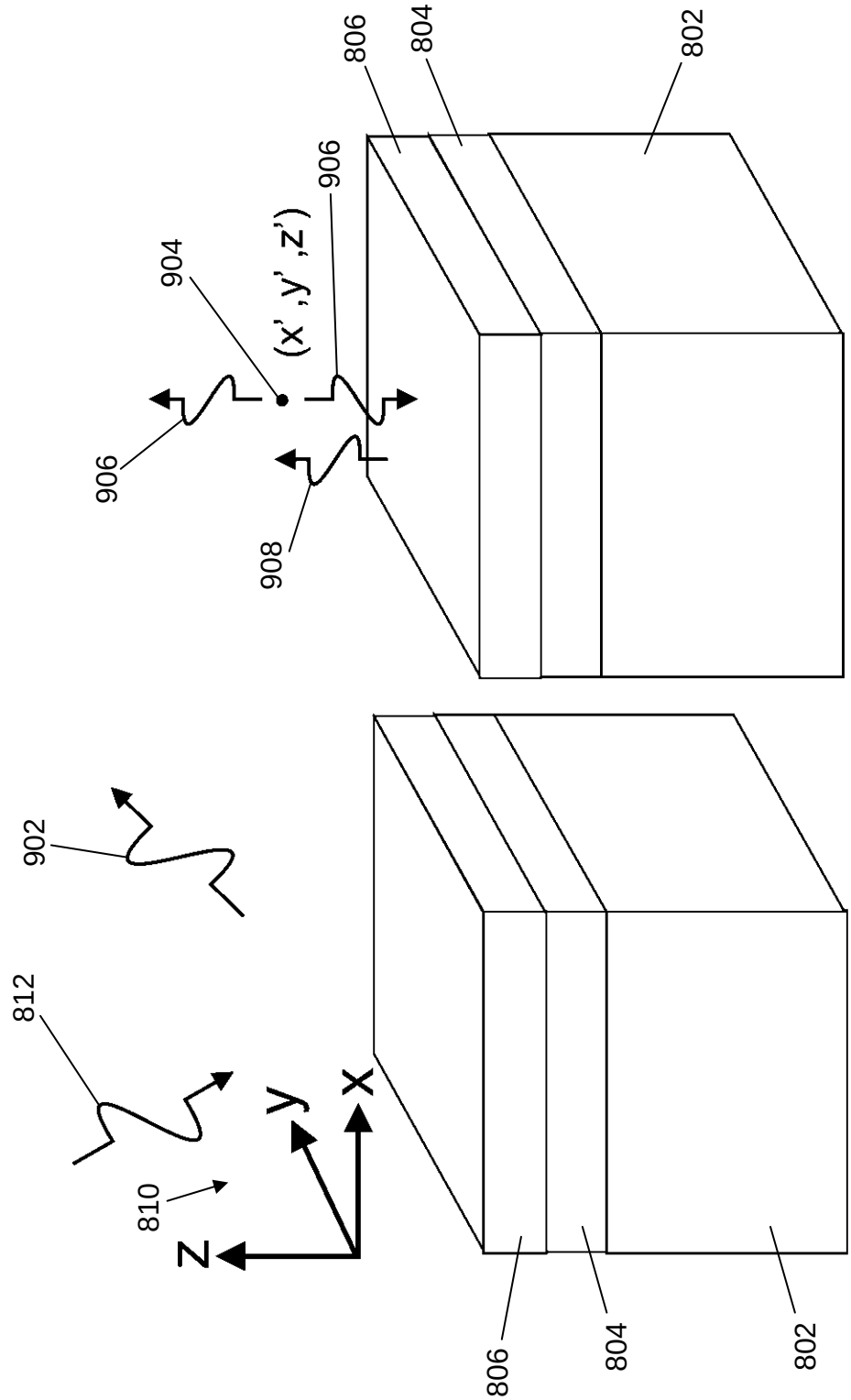


Fig. 8

Fig. 9

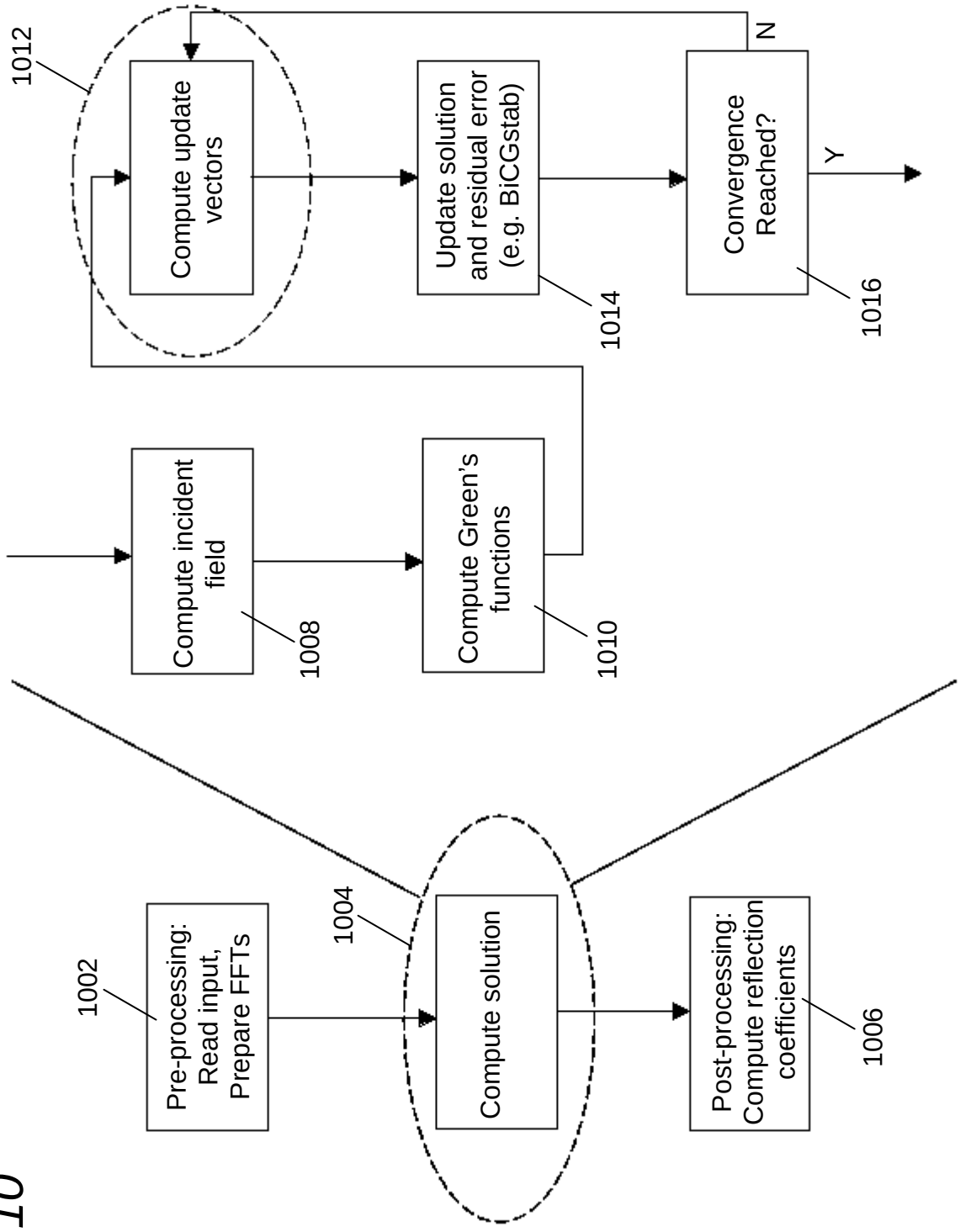
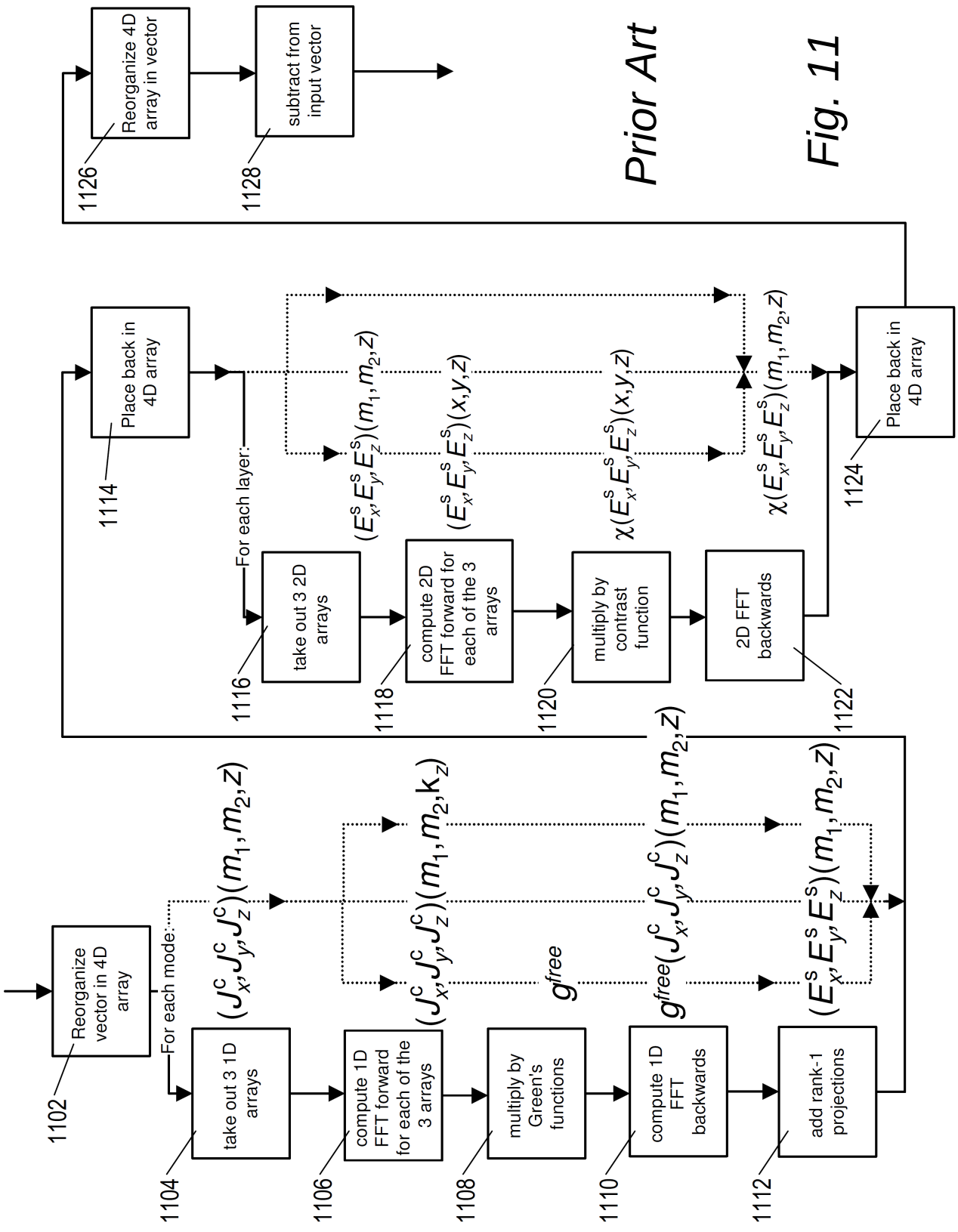

Pre-processing: Read input, Prepare FFTs
1002
Compute solution
1004
Post-processing: Compute reflection coefficients
1006
Compute incident field
1008
Compute Green's functions
1010
1012
Compute update vectors
Update solution and residual error (e.g. BiCGstab)
1014
Convergence Reached?
1016
N
Y

Fig. 10



Prior Art

Fig. 11

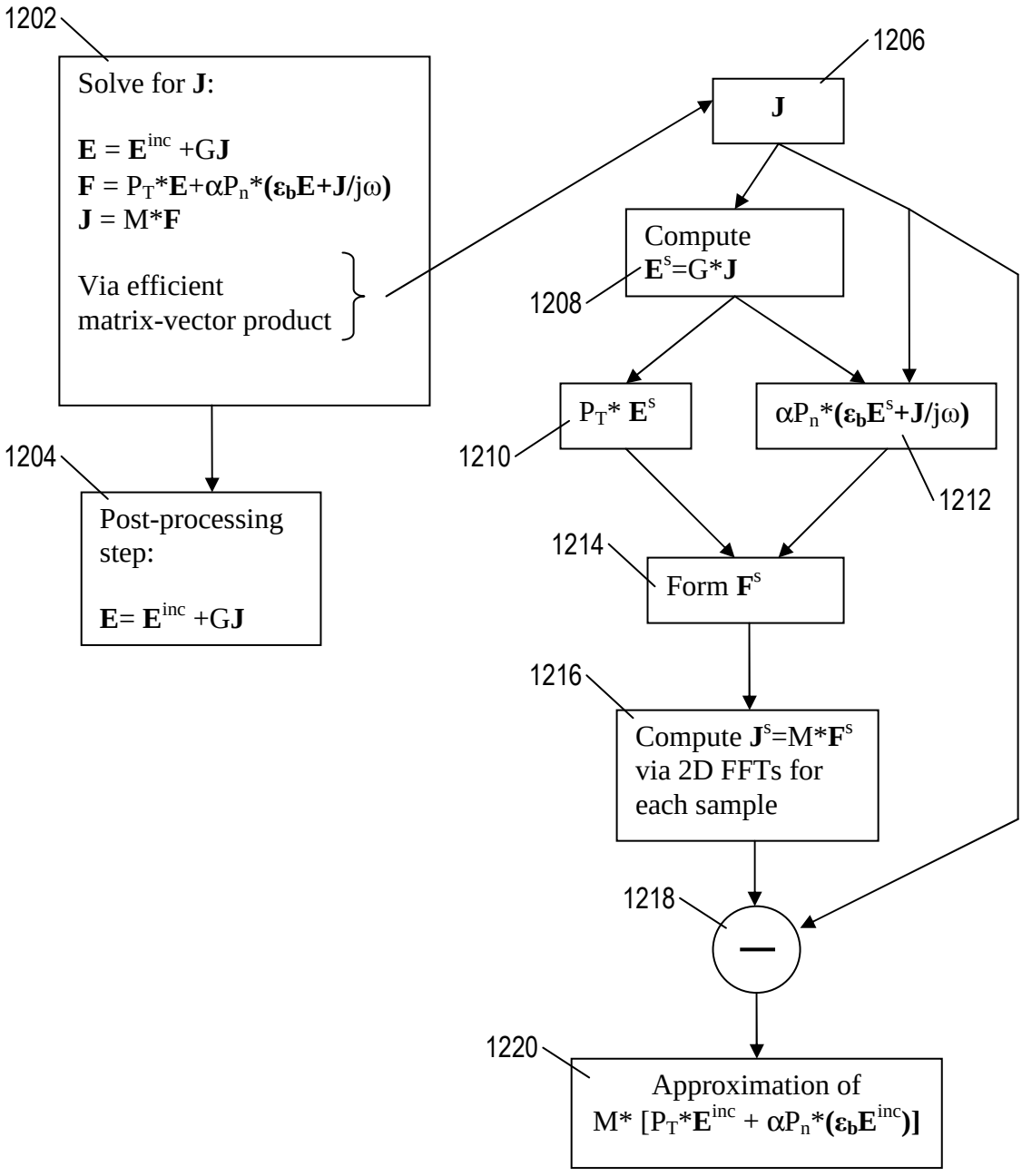
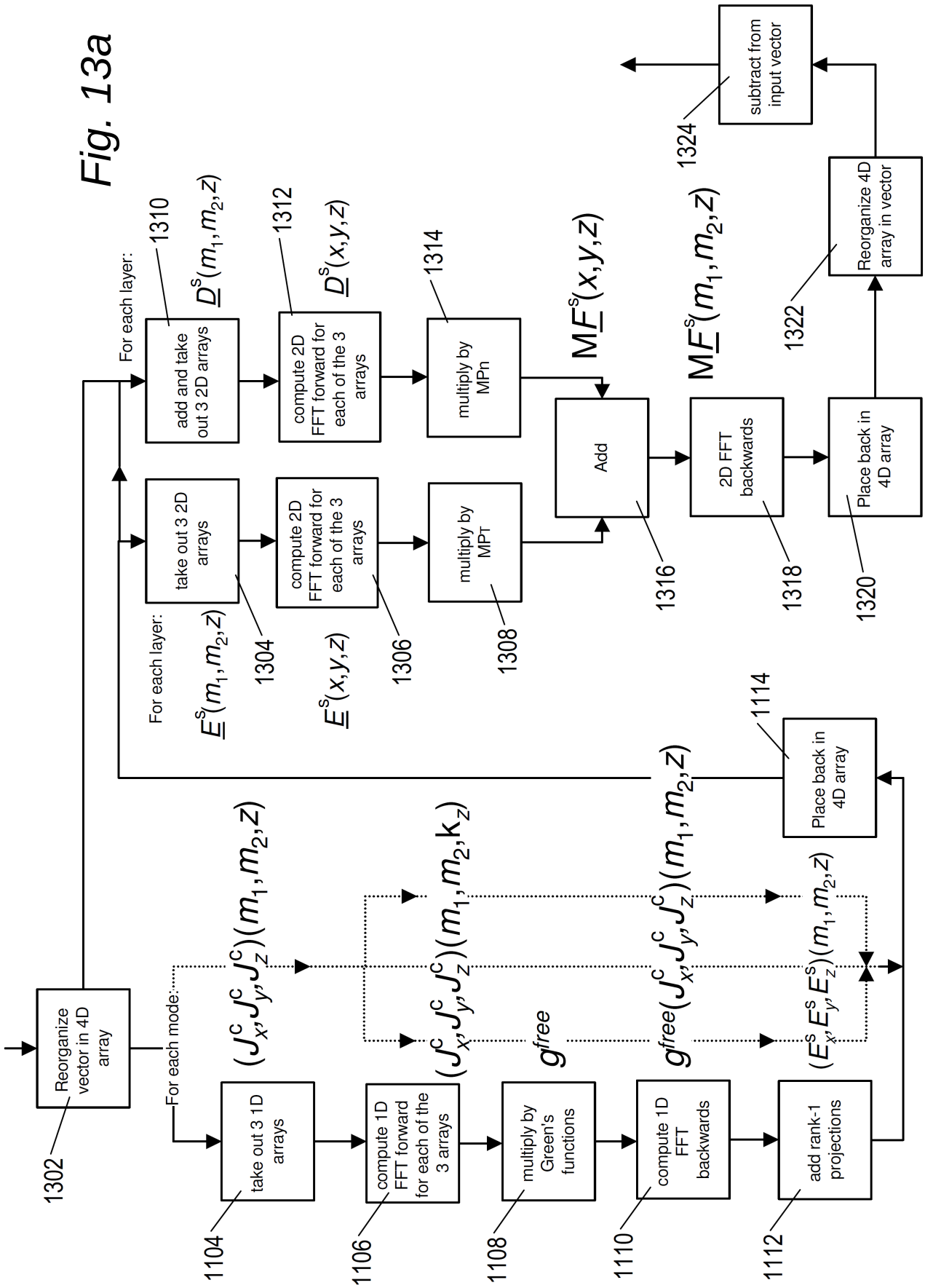

1202
Solve for J:
E = E^inc +GJ
F = P_T*E+αP_n*(ε_bE+J/jω)
J = M*F
Via efficient matrix-vector product
1204
Post-processing step:
E= E^inc +GJ
1206
J
Compute E^s=G*J
1208
P_T* E^s
αP_n*(ε_bE^s+J/jω)
1210
1212
1214
Form F^s
1216
Compute J^s=M*F^s via 2D FFTs for each sample
1218
1220
Approximation of M* [P_T*E^inc + αP_n*(ε_bE^inc)]

Fig. 12

Fig. 13a


1302
Reorganize vector in 4D array
For each mode:
1104
take out 3 1D arrays
1106
compute 1D FFT forward for each of the 3 arrays
1108
multiply by Green's functions
1110
compute 1D FFT backwards
1112
add rank-1 projections
1114
Place back in 4D array
For each layer:
1304
take out 3 2D arrays
1306
compute 2D FFT forward for each of the 3 arrays
1308
multiply by MPT
For each layer:
1310
add and take out 3 2D arrays
1312
compute 2D FFT forward for each of the 3 arrays
1314
multiply by MPn
1316
Add
1318
2D FFT backwards
1320
Place back in 4D array
1322
Reorganize 4D array in vector
1324
subtract from input vector

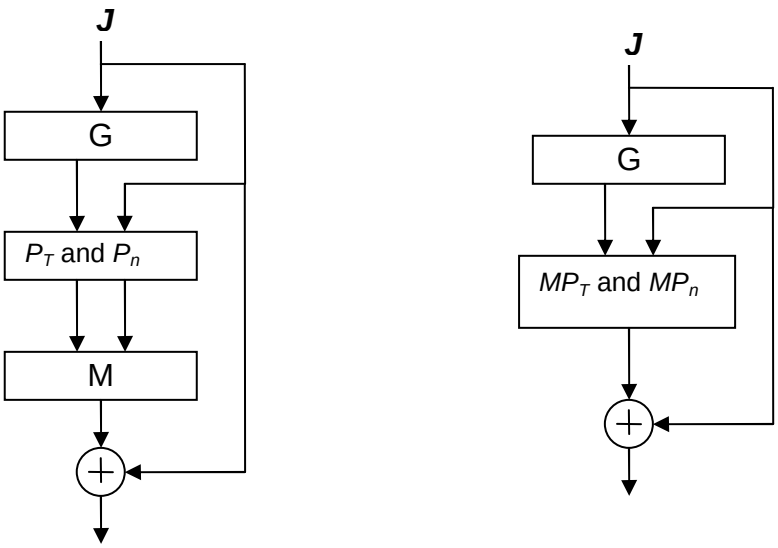


Fig. 13b

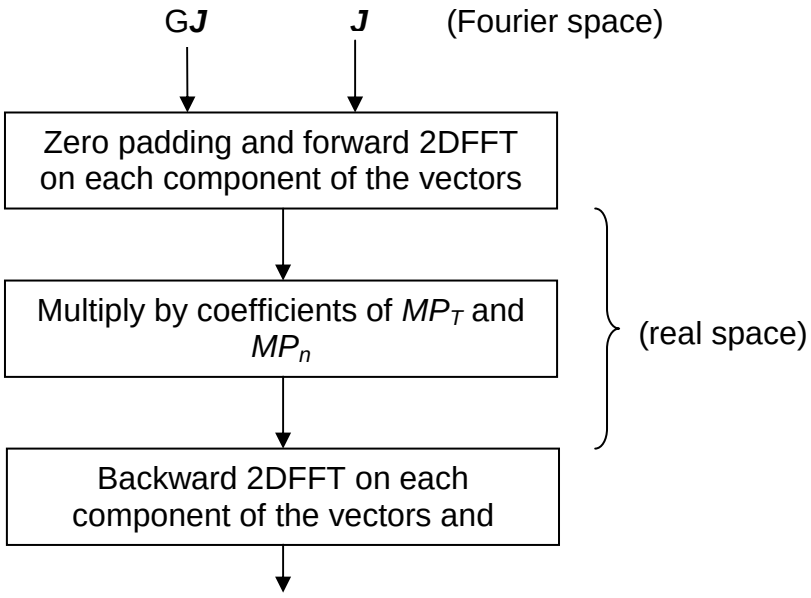


Fig. 13c

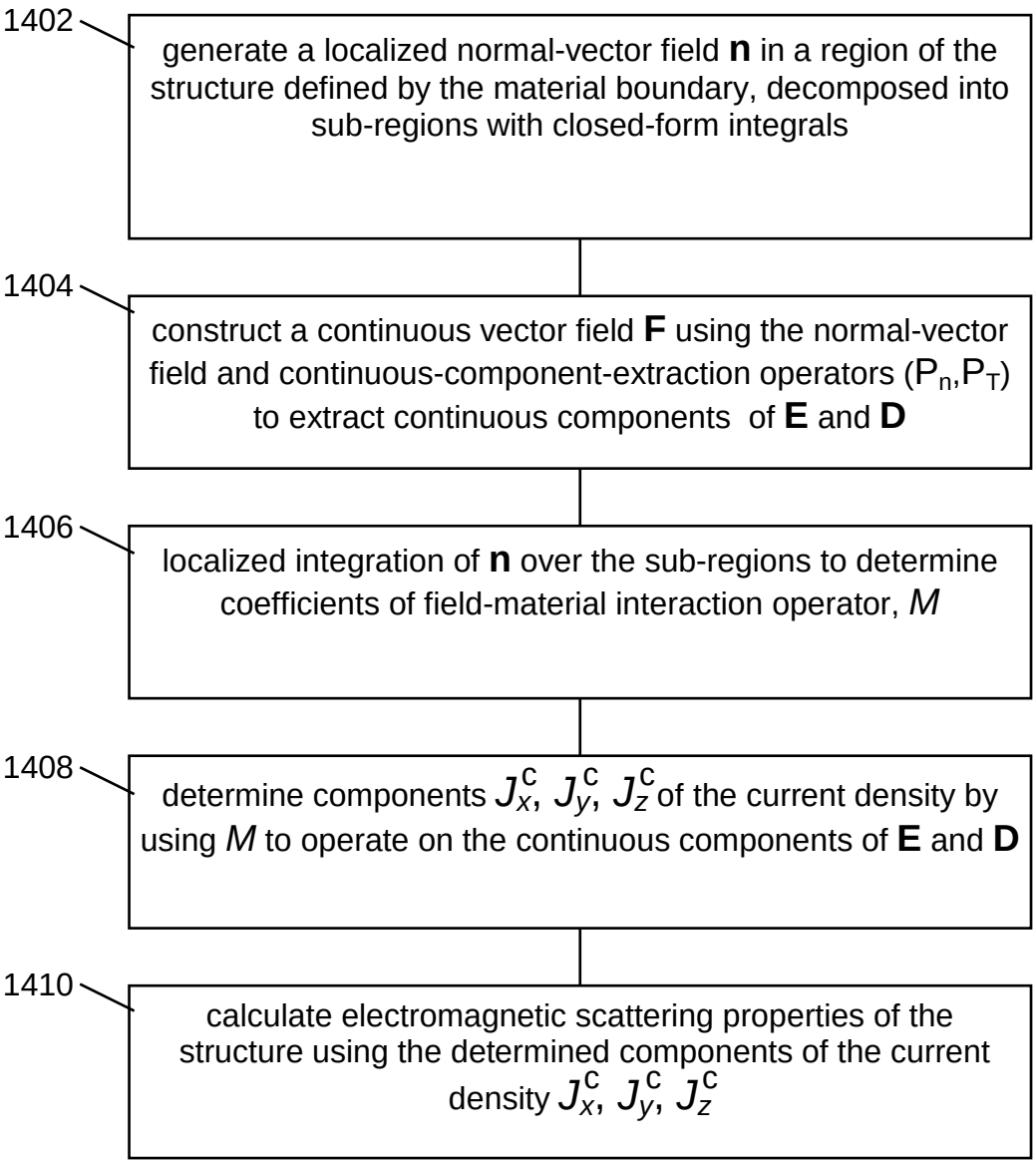

1402
generate a localized normal-vector field **n** in a region of the structure defined by the material boundary, decomposed into sub-regions with closed-form integrals
1404
construct a continuous vector field **F** using the normal-vector field and continuous-component-extraction operators (P_n,P_T) to extract continuous components of **E** and **D**
1406
localized integration of **n** over the sub-regions to determine coefficients of field-material interaction operator, *M*
1408
determine components J_x^c, J_y^c, J_z^c of the current density by using *M* to operate on the continuous components of **E** and **D**
1410
calculate electromagnetic scattering properties of the structure using the determined components of the current density J_x^c, J_y^c, J_z^c

Fig. 14

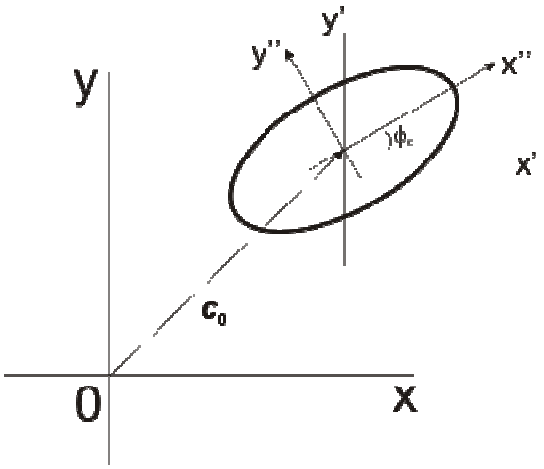


Fig. 15a

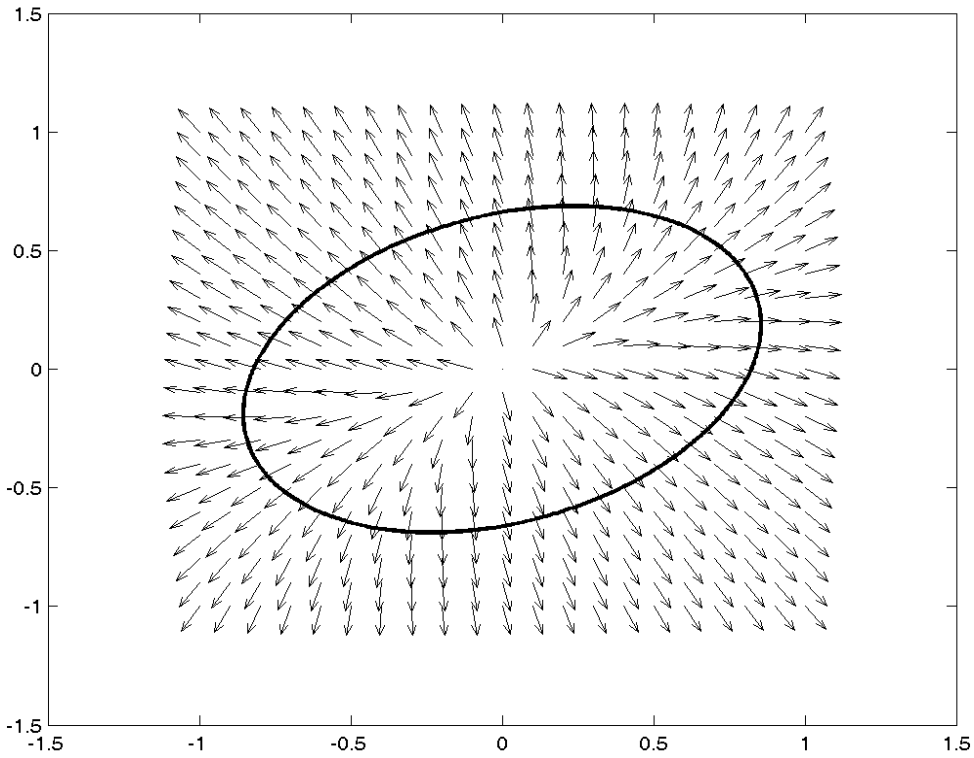


Fig. 15b

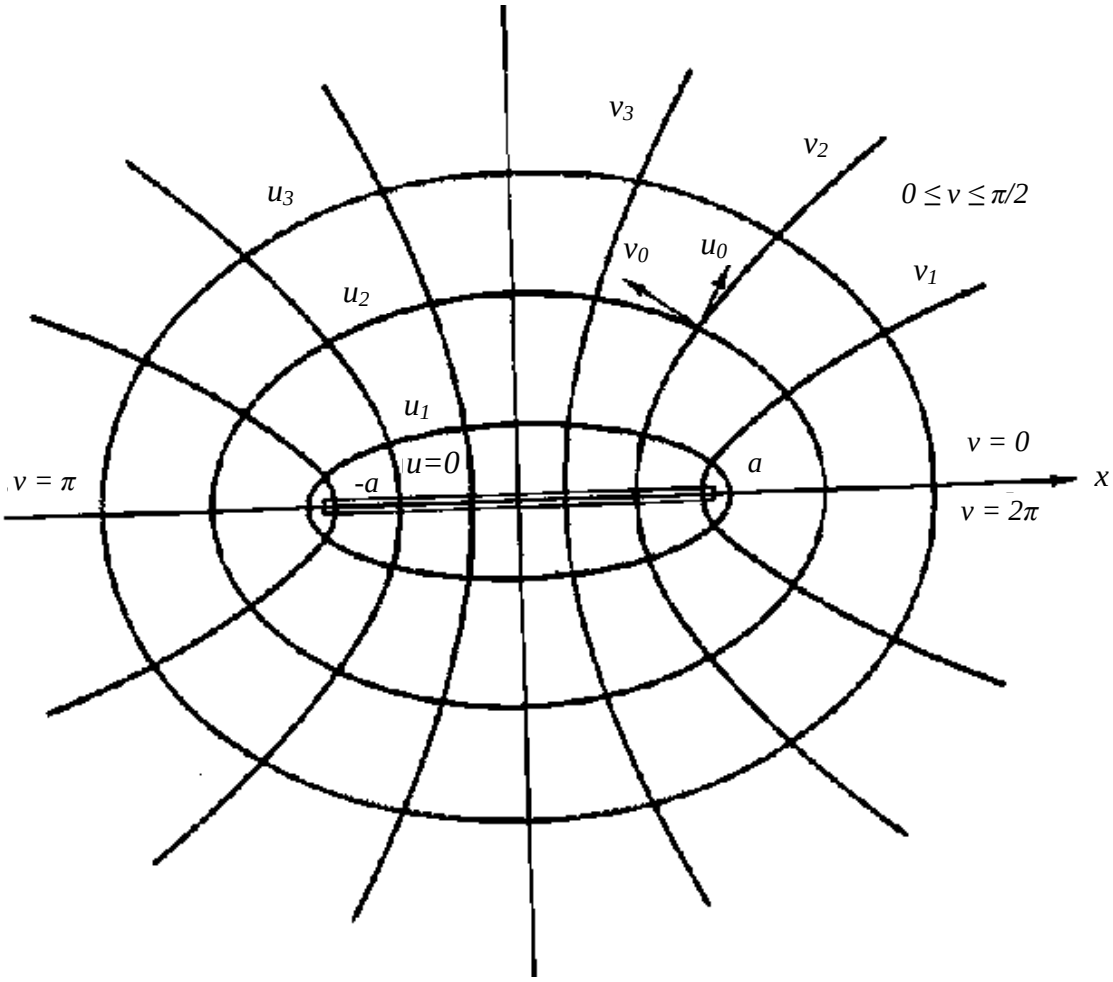


Fig. 15c

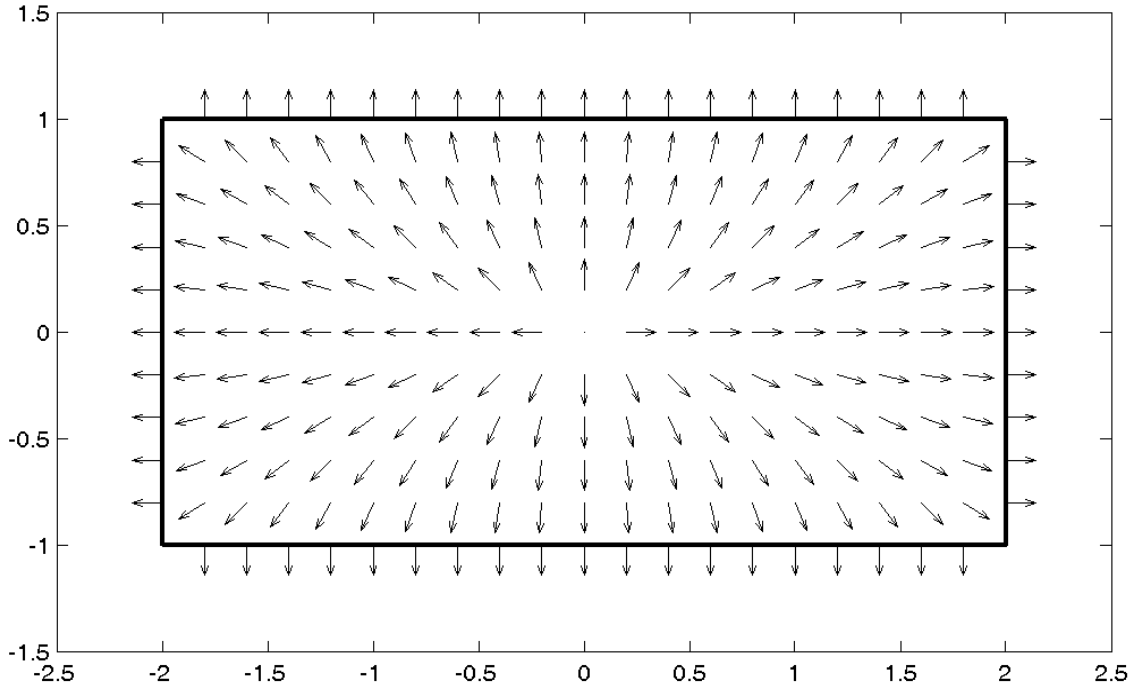


Fig. 16a

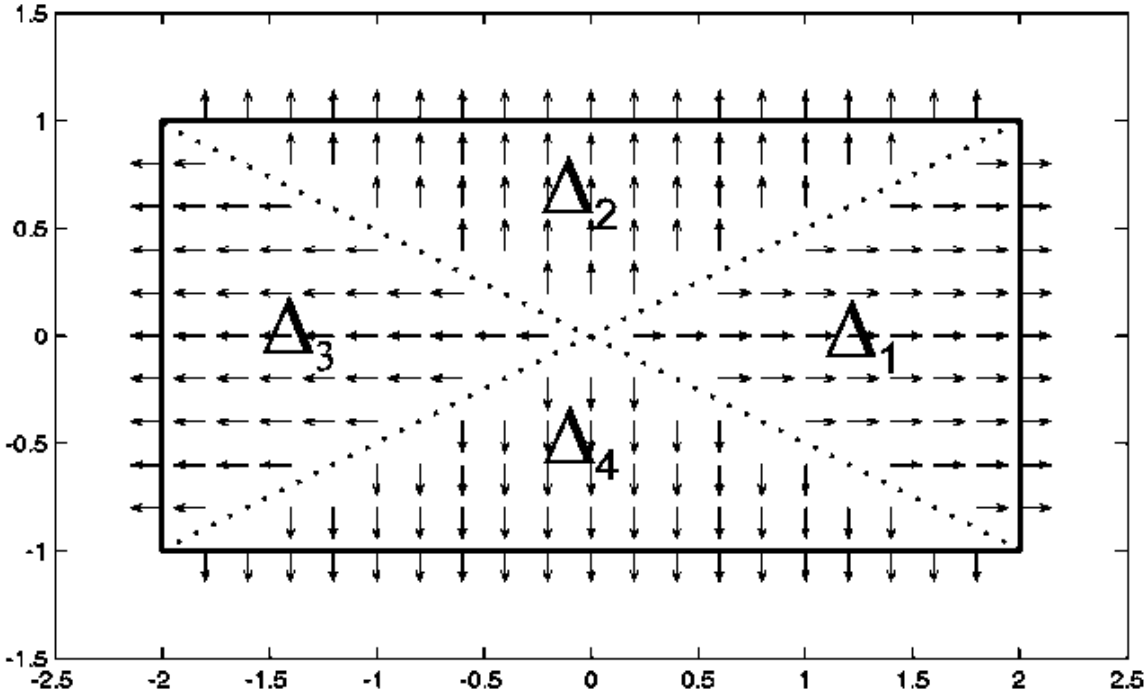


Fig. 16b

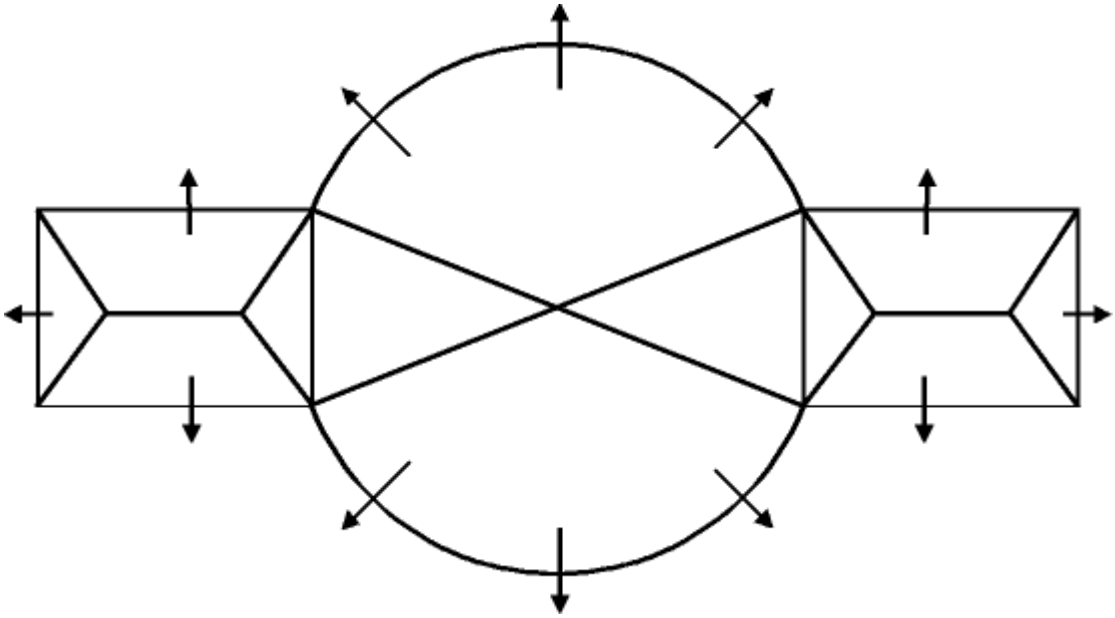


Fig. 17

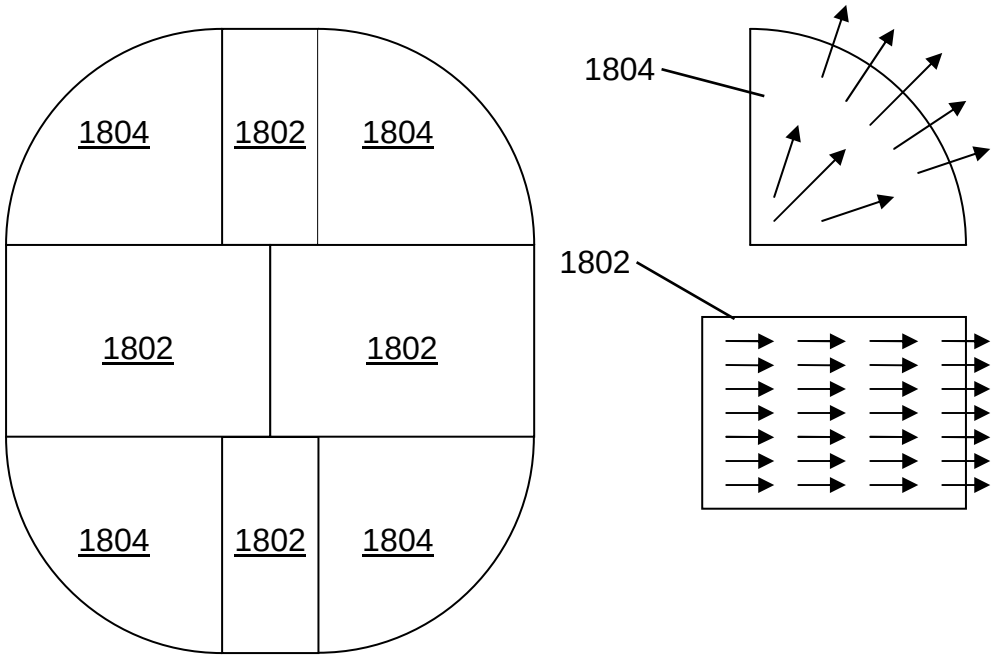


Fig. 18

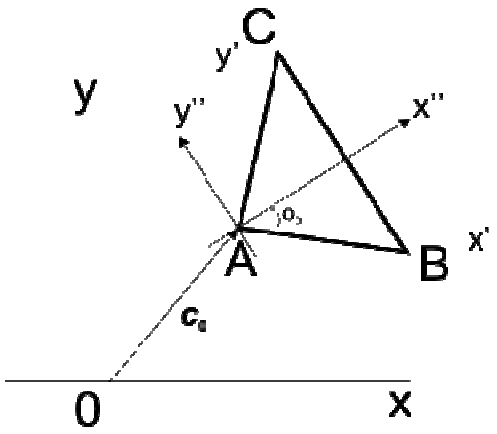


Fig. 19

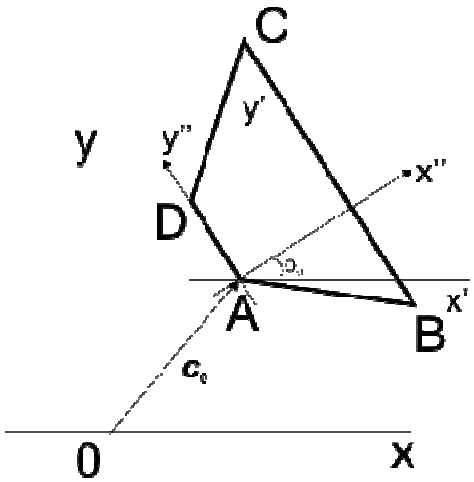


Fig. 20

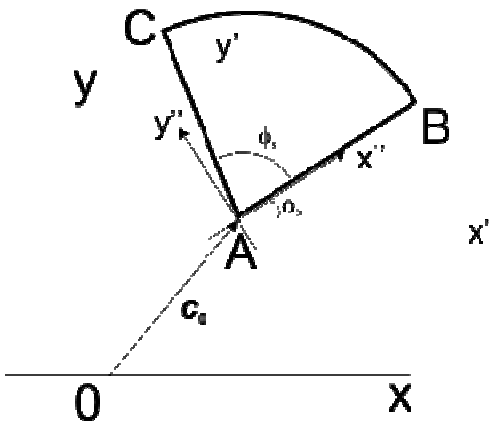


Fig. 21

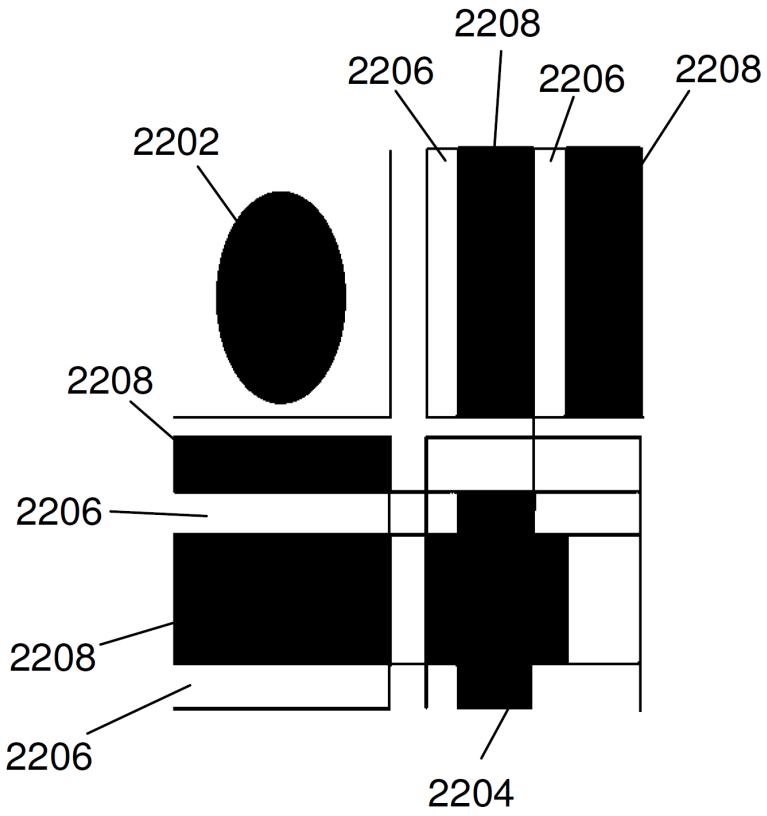


Fig. 22

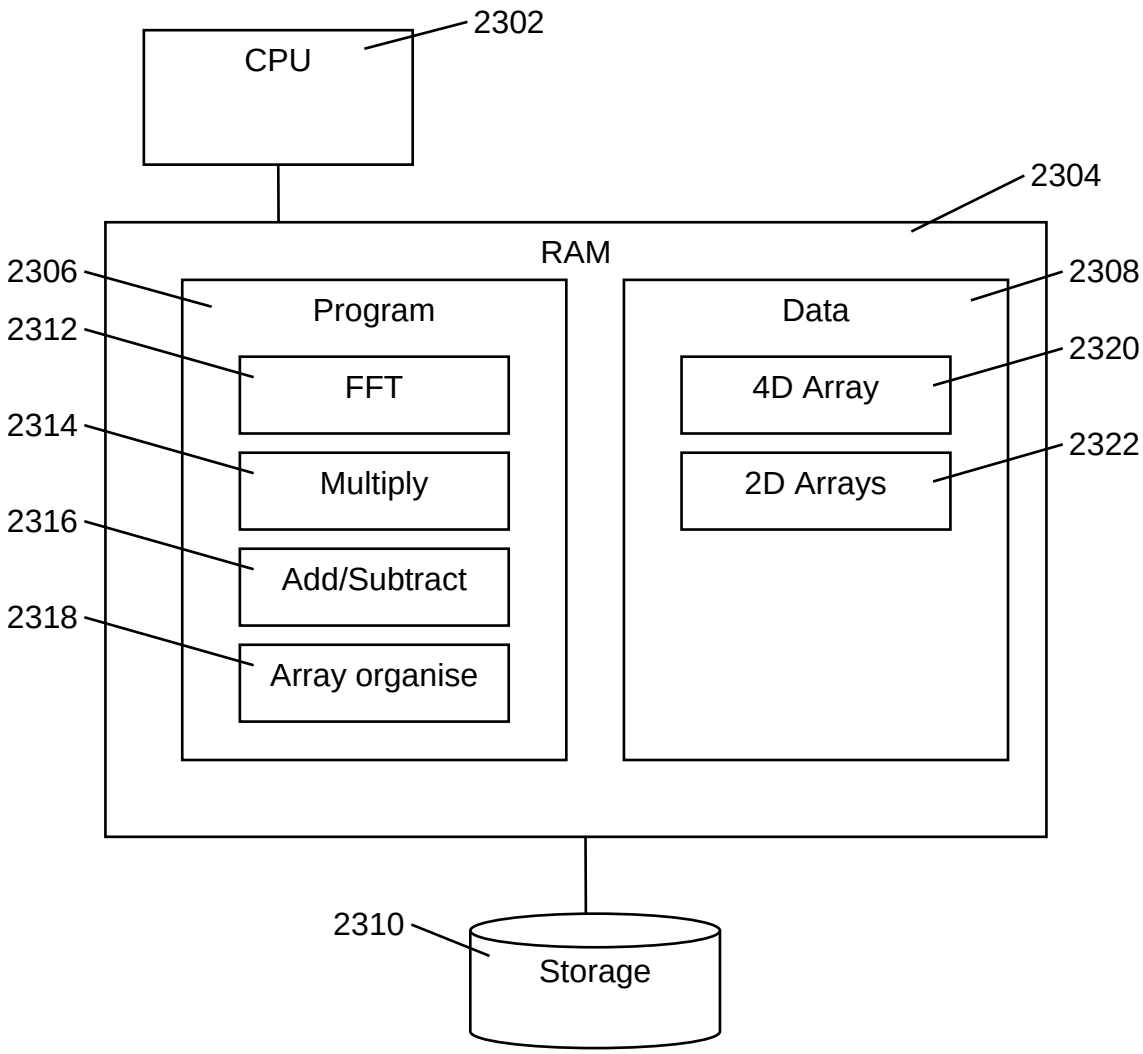

CPU
2302
2304
RAM
2306
Program
2308
Data
2312
FFT
2320
4D Array
2314
Multiply
2322
2D Arrays
2316
Add/Subtract
2318
Array organise
2310
Storage

Fig. 23