In step 455, the updated estimate of the wave function at the current slice is back-propagated to previous slice according to

$$\psi^{e}{}_{b,n-1}(x,y) = \wp^{-1}_{\Delta z_{n-1}}\left[\psi^{i}{}_{b,n}(x,y)\right]$$

, where Δz_{n-1} is the distance between slice n and the previous slice n−1.

In step 445, updates occur on both the associated transmission function, $O_{n-1}(x,y) = U_O[O_{n-1}(x,y)]$ and the illumination function incident on that slice $\psi^{i}{}_{b,n-1}(x,y) = U_{illum}\left[\psi^{i}{}_{f,n-1}(x,y)\right]$ as in the previous iteration of step 445.

In step 450, if there remain further previous slices, the newly-estimated function $\psi^{i}{}_{b,n-1}(x,y)$ is back propagated to the next previous slice, where a further pair of updates are undertaken, and so on and so forth through all slices 540, 550, employing the generalised updates functions in Equations 2 and 3, until eventually a new estimate of the illumination on the front surface of the object 510, ~~$P(x-X_j, y-Y_j=\psi ib,1x,y$ is determined.~~ $P(x-X_j, y-Y_j) = \psi^{i}{}_{b,1}(x,y)$ is determined.

The innermost iteration for the second embodiment can be repeated from step 405, although in general it is preferable now to select a new probe position j, if all the probe positions have not been considered, as in step 460. The new probe position is selected in step 465. The updated estimate of illumination at the first plane $P(x,y)$ calculated in step 445 is used as the illumination at the first plane in step 410, which is re-selected in step 470 as the current plane. Steps 410-455 are repeated for all subsequent probe positions, employing the respective diffraction pattern data for each position.

In step 460, if all probe positions have been addressed in the field-of-view iteration, the method moves to step 475 where further field-of-view iterations are undertaken until a condition is met, or a certain number of field-of-view iterations have been finished, as discussed in the cited references. If the method is repeated, the probe position is reset and the first plane re-selected in step 480.

As introduced above, embodiments of the present invention may be utilised to determine transmission functions for a plurality of slices intersecting an object,