[0048] where

$$M(v) = \left| \frac{F_{X'}(v)/F_{X}(0)}{F_{X}(v)/F_{X}(0)} \right|$$

is defined as the modulation transfer function where $F_{X'}(v)$ and $F_X(v)$ are representations of the distorted and undistorted images in the frequency domain respectively and $F_X(0)=F_{X'}(0)$ are the average luminance's of the distorted and undistorted images

$$M_t = \frac{1}{CSF(\omega(v))}$$

where CSF(ω) is the contrast sensitivity function

[0049] $M_D(v)$ is the filtered image and $M_{D_0}(v)$ is the unfiltered image that is being compared

[0050] $M_M(v)$ is the image with moiré and $M_{M_0}(v)$ is the ideal image without moiré.

[0051] Preferably, there is little perceptible moiré interference present and the object maintains its original image quality, and as such the BDTF of the spatial filter and the distance of said spatial filter from the display is picked such that the value of D, in equation (3) above is at a minimum for any given set of pixel patterns.

[0052] The advantages will become clear when the modern product development process is considered. Nowadays the this could be broken down into the following five phases

[0053] i. Specification

[0054] ii. Soft prototyping

[0055] iii. Hard prototyping

[0056] iv. Validation

[0057] v. Manufacturing

[0058] Within the development process, steps (ii) to (iv) are repeated many times, to get the product to the point where the it is suitable for manufacture. Step (ii) in the modern process requires the use of computer aided design tools which significantly reduce the number of iterations at step (iii). There exist no specialised tools in the prior art for the purposes of multi-layered optics, typically those available use Monte Carlo ray tracing techniques which involve large numbers of calculations.

[0059] According to another embodiment of this invention the results contained within equations (1), (2) or (3) are incorporated into an algorithm where

[0060] (i) The distance between the spatial filter and the object

[0061] (ii) The pixel structure for the object layers

[0062] (iii) The available spatial filters

[0063] (iv) The refractive indices within the optical stack are entered and the algorithm provides

[0064] (a) a subjective image quality value for each combination of the above parameters

[0065] (b) the best configuration of the distance between layers and the spatial filter.

[0066] The algorithm provides a procedure to preserve the image quality by the and abate more interference by the manipulation and optimization of the point spread function acting on the image caused by the spatial filter, and additionally provides a simple, timely means to do this in absence of a group of observers and at the soft prototype stage.

[0067] To further appreciate the advantages of a soft prototyping system, in terms of cost and time, over a trial and error approach consider the following example: In multi-layered displays the gap between the diffuser and object layer is controlled by "adjusting" the thickness of a birefringence free substrate such as glass or acrylic. In reality this adjustment is not trivial. Because layers in the stack are viewed through polarizers, any stress on or within these layers causes birefringence which appears as coloured or dark patches within the display. So cast acrylic is generally used, as extruding the material induces stress, introducing unwanted birefringence into the multi-layered display stack. On the other hand if the casting method of forming the acrylic is used, there is no birefringence present however the thickness across the sheet can vary by millimetres resulting in variable image quality. There exist proprietary methods to overcome this dilemma, however there is no "real time" adjustment possible. In order to change the thickness of the substrate die and machine set-ups need to be altered resulting in considerable delays and expense.

[0068] Additionally there is the problem that one needs to have a physical object, that is one cannot determine the correct thickness of acrylic to be used by specification of the object alone. If the object is a flat panel display then it is necessary that the display be first constructed, which can take between 6 and 12 months and incur large costs, typically in the order of millions of $USD. This implies that there is no way of determining the optimum object specification, so a display that is optimised for the purposes of layering can be specified correctly first time.

[0069] According to yet another aspect of the present invention an image will have a periodic pattern which is asymmetric. Pixel patterns which are commonly employed in display technologies are asymmetric. For example the red, green, blue stripe pattern commonly found in liquid crystal displays and other display technologies are asymmetric in their arrangement.

[0070] Commonly available filters are circularly symmetric. The result of applying a circularly symmetric filter on an asymmetric pixel image pattern is a circularly symmetric point spread function—resulting in over-blurring of the initial image and over degradation of the image quality.

[0071] In another embodiment of the invention control spread function caused by a spatial diffuser acting upon an image with an asymmetric pattern can be soft and hard prototyped by varying the distance between such image and said spatial filter(s) and by varying bidirectional scattering