described by a primitive lattice cell comprised of two linearly independent vectors which form two sides of a parallelogram.

[0020] The following radio metric quantities will be used throughout this specification are defined below:

[0021] Luminous Flux is the flow rate of visual energy and is measured in lumens.

[0022] Illuminance is a measure of photometric flux per unit area, or visible flux density. Illuminance is measured in lux (lumens per square meter).

[0023] Luminance is the illuminance per solid angle.

[0024] To appreciate the solid angle concept consider a spherical surface of radius r containing an area element ΔA. The solid angle at the centre of the sphere is defined to be

$$\Delta\Omega = \frac{\Delta A}{r^2}.$$

[0025] Pixels on a transmissive addressable object will be capable of maximum and minimum luminous states. Labelling the maximum state as L_b and the minimum as L_d then the contrast ratio is described by

$$C_r = \frac{L_b}{L_d}$$

[0026] The term contrast ratio is usually abbreviated to just contrast.

[0027] From http://www.cquest.utoronto.ca/psych/psy280f/ch6/csf.html "The contrast sensitivity function (CSF) plots the contrast sensitivity for the human visual system (1/(contrast threshold)) for all spatial frequencies. Viewers are most sensitive to intermediate frequencies (~4-8 cycles per degree). Viewers are less sensitive to lower frequencies, and less sensitive to higher frequencies.

[0028] The CSF shows us the observer's window of visibility. Points below the CSF are visible to the observer (those are the points that have even higher contrasts than the threshold level). Points above the CSF are invisible to the observer (those are the points that have lower contrasts than the threshold level). The lowest visible frequency (at 100% contrast) is the low frequency cut-off, and the highest visible frequency (at 100% contrast) is the high frequency cut-off."

DISCLOSURE OF INVENTION

[0029] According to one aspect of the present invention there is a method of controlling the point spread function;

[0030] The term 'point spread function' is defined as the output of the imaging system for an input point source, in particular it describes the distribution of a single object point after passing through a filter with a particular spatial frequency response;

[0031] in an optical system consisting of an object, at least one spatial filter, and the image projected by that object with said spatial filter(s) located between said object and said image where said point spread function is a representation of the application of spatial filter(s) on said image;

[0032] with said point spread function controlled by varying the distance between said image and said spatial filter(s) and bidirectional scattering transmission function of the spatial filter(s).

[0033] The spatial filter is characterised by the bidirectional scattering transmission distribution function, which describes how a small cone of light rays around a single point is transmitted through a surface. Said function is defined as

$$f_s(\omega_i \to \omega_o) = \frac{dL_o(\omega_o)}{L(\omega_i)d\sigma^{\perp}(\omega_i)}$$

where the left hand side of the equation is the observed radiance in the direction of ω_o, per unit of irradiance arriving from ω_i. The arrow on the left hand side of the equation symbolises the direction of the light flow. The equation on right hand side is the ratio of the luminance out to the illuminance in, contained in a small solid angle around a ω_i.

[0034] The, or each, spatial filter may be any type of spatial filter used in known optical technology such as, for example, a holographic diffuser, prismatic filter, a hologram, or any filter that changes the direction of light in a defined way. Reference throughout this specification to a spatial diffuser is purely exemplary and should not be viewed as limiting in any way.

[0035] Said point spread function can be determined by the following equation

$$PSF(x_D, y_D, Z_{OD}, Z_{LD}) = \frac{f_s(\varpi_i \to \varpi_o)L_O(\theta_H, \theta_V)A_{pupil}^2}{\left(\frac{(x_D - x_O)^2}{M^2} + \frac{(y_D - x_O)^2}{M^2} + Z_{OD}^2\right)\left(\frac{x_R^2}{M^2} + \frac{y_R^2}{M^2} + Z_{DL}^2\right)} M^2 \quad (1)$$

where

$$\theta_H = \tan^{-1}\left(\frac{x_R}{MZ_{OD}}\right)$$

$$\theta_V = \tan^{-1}\left(\frac{y_R}{MZ_{OD}}\right)$$

[0036] Table 1 introduces all of the relevant notation, note that one example of a projective system is the object, the cornea/lens and the retina system but the discussion pertains to any system containing an object, a lens an image:

x, y, z	x, y, z coordinates
Z_{OD}	Distance along z axis between object and diffuser
Z_{DL}	Distance along z axis between diffuser and lens