CLAIMS

~~1. A method for guiding light by employing an optical valve, comprising:~~

~~allowing light rays to propagate in a first direction through the optical valve, wherein the light propagates in the first direction with substantially low loss;~~

~~allowing the light rays to interact with an end surface of the optical valve; and~~

~~allowing the light rays to propagate in a second direction through the optical valve,~~

~~wherein at least some of the light rays encounter at least one extraction feature and are extracted from the optical valve.~~

~~2. The method for guiding light by employing an optical valve of claim 1, wherein the light rays enter the optical valve at a first end.~~

~~3. The method for guiding light by employing an optical valve of claim 2, wherein the end surface is located at a second end of the optical valve.~~

~~4. The method for guiding light by employing an optical valve of claim 3, wherein the second end of the optical valve is thicker than the first end of the optical valve.~~

~~5. The method for guiding light by employing an optical valve of claim 1, wherein the light rays propagating in the first direction, propagate from the first end to the second end, further wherein the light rays propagating in the second direction propagate from the second end to the first end.~~

~~6. The method for guiding light by employing an optical valve of claim 5, wherein the second end is a reflecting surface.~~

~~7. The method for guiding light by employing an optical valve of claim 6, wherein the second end is a curved surface.~~

~~8. The method for guiding light by employing an optical valve of claim 1, wherein the light rays encountering the at least one extraction feature further comprises the light rays reflecting off the extraction feature.~~

~~9. The method for guiding light by employing an optical valve of claim 8, wherein the light rays reflecting off the extraction feature further comprises the light rays exceeding the critical angle with respect to the z-axis.~~

~~10. The method for guiding light by employing an optical valve of claim 1, further comprising allowing the light to substantially homogenize and expand when propagating in the first direction.~~

~~11. The method for guiding light by employing an optical valve of claim 1 , further comprising allowing the light to be optically adjusted at the second end of the optical valve.~~

~~12. The method for guiding light by employing an optical valve of claim 11, wherein optically adjusting the light further comprises substantially locally redirecting the light.~~

~~13. The method for guiding light by employing an optical valve of claim 11, wherein optically adjusting the light further comprises imaging the light at the second end of the optical valve.~~

~~14. The method for guiding light by employing an optical valve of claim 1, wherein light is generated by illumination elements and the light enters at the first end of the optical valve.~~

~~15. The method for guiding light by employing an optical valve of claim 14, wherein the illumination elements are LEDs.~~

~~16. The method for guiding light by employing an optical valve of claim 1, wherein the xz angular profile of the light may remain substantially unchanged while propagating in the first direction.~~

~~17. The method for guiding light by employing an optical valve of claim 1, further comprising providing a substantially uniform illumination across a display.~~

~~18. The method for guiding light by employing an optical valve of claim 1, further comprising optimizing the efficiency of the optical valve by substantially employing TIR reflections.~~

~~19. A light valve for guiding light, comprising:~~

~~a first light guiding surface, wherein the first light guiding surface is substantially planar;~~

~~and~~

~~a second light guiding surface, opposite the first light guiding surface, further comprising a plurality of guiding features and a plurality of extraction features, wherein the extraction features and the guiding features are connected to and alternate with one another respectively, further wherein the plurality of extraction features allow light to pass with substantially low loss when the light is propagating in a first direction and allow light to reflect and exit the light valve when the light is propagating in a second direction.~~

~~20. The light valve for guiding light of claim 19, further comprising a first end, wherein light may enter the light valve at the first end.~~

~~21. The light valve for guiding light of claim 19, further comprising a second end, wherein light may interact with the second end and be redirected back toward the first end.~~

~~22. The light valve for guiding light of claim 19, wherein the first end is thinner than the second end.~~

~~23. The light valve for guiding light of claim 21, wherein the second end is a reflecting surface.~~

~~24. The light valve for guiding light of claim 21, wherein the second end is a curved surface.~~

~~25. The light valve for guiding light of claim 19, wherein the extraction features are optically hidden from light propagating in a first direction.~~

~~26. The light valve for guiding light of claim 19, further comprising illumination elements for generating light to enter at the first end of the light valve.~~

~~27. The light valve for guiding light of claim 26, wherein the illumination elements are LEDs.~~

~~28. The light valve for guiding light of claim 26, wherein the illumination elements are an array of illumination elements configured to provide light at the first end of the light valve.~~

~~29. The light valve for guiding light of claim 19, wherein each of the plurality of extraction features are oriented at approximately 45 degrees to each of the plurality of guiding features.~~

~~30. The light valve for guiding light of claim 19, wherein each of the plurality of extraction features are substantially elongated, linear surfaces.~~

~~31. The light valve for guiding light of claim 19, wherein each of the plurality of extraction features are substantially planar.~~

~~32. The light valve for guiding light of claim 19, wherein each of the plurality of extraction features are substantially parallel to one another.~~

~~33. The light valve for guiding light of claim 19, wherein each of the plurality of extraction features are separated by substantially the same distance.~~

~~34. The light valve for guiding light of claim 19, wherein at least one of the plurality of extraction features is coated with a reflective coating.~~

~~35. The light valve for guiding light of claim 19, wherein the plurality of extraction features have a tilt angle in the approximate range of 10-90 degrees.~~

~~36. The light valve for guiding light of claim 19, wherein the plurality of extraction features have a tilt angle between approximately 20 and 50 degrees.~~

~~37. The light valve for guiding light of claim 19, wherein the plurality of extraction features have a tilt angle between approximately 30 and 48 degrees.~~

~~38. The light valve for guiding light of claim 19, wherein the guiding features are substantially planar.~~

~~39. The light valve for guiding light of claim 19, wherein the guiding features are substantially parallel to the first light directing side.~~

~~40. The light valve for guiding light of claim 19, wherein the guiding features have a wedge angle compared to the first light directing side.~~

~~41. The light valve for guiding light of claim 19, wherein the second end is a concave mirror.~~

~~42. The light valve for guiding light of claim 19, wherein the second end is coated with a reflective coating.~~

~~43. The light valve for guiding light of claim 19, wherein the second end is a cylindrical mirror.~~

~~44. The light valve for guiding light of claim 43, wherein the optical axis of the cylindrical mirror is substantially orthogonal to the surface normal of the first light guiding surface.~~

~~45. The light valve for guiding light of claim 19, wherein each guiding feature has a surface normal direction to direct at least some of the light rays propagating in the first direction.~~

~~46. The light valve for guiding light of claim 19, wherein each extraction feature has a surface normal direction to direct at least some of the light rays propagating in the second direction to be extracted in a direction outside the light valve.~~

~~47. The light valve for guiding light of claim 19, wherein the extracted light ray passes from the extraction feature, and exits from the light valve through the first light guiding surface.~~

~~48. The light valve for guiding light of claim 26, wherein the second light guiding surface is configured so that light rays from the illumination elements are incident on the light extracting features after reflecting from the second end.~~

~~49. The light valve for guiding light of claim 19, wherein the plurality of extraction features further comprise:~~

~~a first region wherein the extraction features of the first region have a first orientation; and~~

~~a second region wherein the extraction features of the second region have a second orientation, wherein the first orientation and the second orientations are different from one another.~~

~~50. The light valve for guiding light of claim 19, wherein the first light guiding surface and the second light guiding surface are transparent.~~

~~51. The light valve for guiding light of claim 19, wherein the orientation of the extraction features varies across the optical valve from the first end to the second end.~~

~~52. The light valve for guiding light of claim 21, wherein the second end is a reflective surface with approximately no optical power.~~

~~53. The light valve for guiding light of claim 19, further comprising a Fresnel lens.~~

~~54. The light valve for guiding light of claim 53, wherein the Fresnel lens is spherical in form.~~

~~55. The light valve for guiding light of claim 53, wherein the axis of the Fresnel lens is offset in comparison to the center of the optical valve.~~

~~56. The light valve for guiding light of claim 19, further comprising a vertical diffuser.~~

~~57. The light valve for guiding light of claim 56, wherein the vertical diffuser further comprises an asymmetric scattering surface.~~

~~58. The light valve for guiding light of claim 19, further comprising a diffuser and a Fresnel lens, wherein a gap is provided between the diffuser and the Fresnel lens.~~

~~59. The light valve for guiding light of claim 19, wherein the density of extraction features at the edge of the light valve is lower than the density of extraction features in the center of the light valve.~~

~~60. The light valve for guiding light of claim 19, wherein the extraction features have a variable slope and height from one another, wherein the slope is adjusted to alter the vertical diffusion characteristics and the height is adjusted to vary the amount of light that is extracted from the light valve.~~

~~61. The light valve for guiding light of claim 19, wherein at least some of the extraction features have convex facets.~~

~~62. The light valve for guiding light of claim 19, wherein the height of the extraction features varies across the width of the light valve.~~

~~63. The light valve for guiding light of claim 19, wherein the guiding features are not parallel to each other and are not parallel to the first light guiding surface.~~

~~64. The light valve for guiding light of claim 19, wherein the extraction features are elongate and are configured randomly to reduce Moire patterning.~~

~~65. The light valve for guiding light of claim 19, wherein light extraction is substantially achieved by refraction at the extraction features of the light valve.~~

~~66. The light valve for guiding light of claim 19, further comprising an air cavity.~~

~~67. The light valve for guiding light of claim 19, wherein the extraction features are curved.~~

~~68. The light valve for guiding light of claim 67, wherein the second end is a curved back reflecting surface.~~

~~69. The light valve for guiding light of claim 19, wherein the extraction features have a surface modulation for deflecting light approximately into a set of prescribed horizontal and vertical angles.~~

~~70. The light valve for guiding light of claim 19, wherein the extraction features substantially focus the principal rays of the optical system onto the viewing plane.~~

~~71. An optical valve system, comprising:~~

~~a plurality of illumination elements at least operably coupled to a first end of an optical valve, wherein the optical valve further comprises:~~

~~a first light guiding surface, wherein the first light directing surface is substantially planar; and~~

~~a second light guiding surface, opposite the first light guiding surface, further comprising a plurality of guiding features and a plurality of extraction features, wherein the extraction features and the guiding features are connected to and alternate with each other, further wherein the extraction features may allow light to pass with substantially low loss when the light is propagating in a first direction and may allow light to reflect and exit the light valve when the light is propagating in a second direction.~~

~~72. The optical valve system of claim 71, wherein the plurality of illumination elements are LEDs.~~

~~73. An optical valve system of claim 72, wherein the plurality of illumination elements are configured in an array.~~

~~74. The optical valve system of claim 73, wherein the array of the plurality of illumination elements is an addressable array of LEDs.~~

~~75. An optical valve comprising:~~

~~an input side located at a first end of an optical valve;~~

~~a reflective side located at a second end of the optical valve;~~

a first light directing side and a second light directing side located between the input side and the reflective side of the optical valve, wherein the second light directing side further comprises a plurality of guiding features and a plurality of extraction features, wherein the plurality of guiding features connect respective extraction features.

76. The optical valve of claim 75, wherein the first light directing side is substantially planar.

77. The optical valve of claim 75, wherein the surface normal direction of each extraction feature of the plurality of extraction features is different to the surface normal directions of each of the respective adjacent guiding features of the plurality of guiding features.

78. The optical valve of claim 75, wherein the separation of the first light directing side and second light directing side increases from the input side to the reflective side.

79. A directional display system comprising:

an illuminator array that provides light rays to an optical valve, the optical valve comprising:

a first light guiding surface of the optical valve, wherein the first light guiding surface is substantially planar; and

a second light guiding surface of the optical valve, opposite the first light guiding surface, further comprising a plurality of guiding features and a plurality of extraction features, wherein the plurality of extraction features further comprise a first region and a second region, further wherein the extraction features of the first and second regions have respective orientations such that at least some of the light rays from a first illuminator are directed to a first viewing window outside of the optical valve and at least some of the light rays from a second illuminator are

~~directed to a second viewing window different from the first viewing window outside of the optical valve.~~

~~80. The directional display system of claim 79, wherein the extraction features are configured such that light interacting with a second reflective end provides a real image of the illuminator array.~~

~~81. The directional display system of claim 79, wherein the extraction features have a microscopically variable surface normal direction to provide a diffusion function.~~

~~82. The directional display system of claim 79, wherein the extraction features have a pitch that varies across the surface of the second light guiding surface.~~

~~83. The directional display system of claim 79, wherein the extraction features have a varied height across the length of the optical valve to provide a substantially uniform luminance output across the first light guiding surface.~~

~~84. The directional display system of claim 79, wherein the thickness of the optical valve increases in a first direction from a first end to a second end of the optical valve and increases a second direction from the center to the edge of the optical valve, wherein the second direction is in a substantially orthogonal direction from the first direction.~~

~~85. The directional display system of claim 79, further comprising a lens to direct light from the illuminator elements to respective viewing windows.~~

~~86. The directional display system of claim 85, wherein the lens is a Fresnel lens.~~

~~87. The directional display system of claim 79, wherein the plurality of extraction features further comprise:~~

a first region wherein the extraction features of the first region have a first orientation;

and

a second region wherein the extraction features of the second region have a second orientation, wherein the first orientation and the second orientations are different from one another.

88. The directional display system of claim 87, further comprising a diffuser, wherein the diffusers diffuse in a first direction substantially orthogonal to the first orientation.

89. An observer tracking autostereoscopic display, comprising:

an optical valve;

an array of illumination elements to provide light to the optical valve; and

a sensor for detecting an observer in the proximity of viewing windows of the optical

valve; and

an illuminator controller for determining a setting for the array of illumination elements, wherein the setting determines a first illumination phase for a first set of illuminator elements corresponding to a first viewing window, and the setting determines a second illumination phase for a second set of illuminator elements corresponding to a second viewing window.

90. The observer tracking autostereoscopic display of claim 89, wherein the illumination controller adjusts illumination elements depending on the position of an observer.

~~91. The observer tracking autostereoscopic display of claim 89, wherein the first illumination phase corresponds to a left eye image on a display, and the second illumination phase corresponds to a right eye image on the display.~~

1. A light valve for guiding light, comprising:

a first end at which light may enter the light valve and propagate in a first direction;

a second end comprising a reflective surface arranged to redirect light propagating in said first direction to propagate in a second direction back toward the first end, wherein the second end is a curved reflective surface, or a Fresnel equivalent of a curved reflective surface;

a first light guiding surface extending between the first and second ends, wherein the first light guiding surface is planar; and

a second light guiding surface, extending between the first and second ends opposite the first light guiding surface, further comprising a plurality of guiding features and a plurality of extraction features that are curved along the direction in which they are elongated, wherein the extraction features and the guiding features are connected to and alternate with one another respectively, further wherein the plurality of extraction features allow light to pass with low loss when the light is propagating in a first direction and allow light to reflect and exit the light valve when the light is propagating in a second direction,

wherein a degree of curvature of the extraction features along the direction in which the extraction features are elongated causes the light from a plurality of illumination elements to be focused, whereby the extraction features and the curvature of the second end cooperate to direct focused light into respective viewing windows.

2. The light valve for guiding light of claim 1, wherein the first end is thinner than the second end.

3. The light valve for guiding light of claim 1, wherein the extraction features are optically hidden from light propagating in a first direction.

4. The light valve for guiding light of claim 1, further comprising illumination elements for generating light to enter at the first end of the light valve, wherein the illumination elements are LEDs.

5. The light valve for guiding light of claim 1, further comprising illumination elements for generating light to enter at the first end of the light valve, wherein the illumination elements are an array of illumination elements configured to provide light at the first end of the light valve.

6. The light valve for guiding light of claim 1, wherein each of the plurality of extraction features are elongated, linear surfaces.

7. The light valve for guiding light of claim 1, wherein each of the plurality of extraction features are planar.

8. The light valve for guiding light of claim 1, wherein each of the plurality of extraction features are parallel to one another.

9. The light valve for guiding light of claim 1, wherein each of the plurality of extraction features are separated by the same distance.

10. The light valve for guiding light of claim 1, wherein the plurality of extraction features have a tilt angle between 20 and 50 degrees.

11. The light valve for guiding light of claim 1, wherein the guiding features are planar.

12. The light valve for guiding light of claim 1, wherein the guiding features are parallel to the first light guiding surface.

13. The light valve for guiding light of claim 1, wherein the guiding features have a wedge angle compared to the first light guiding surface.

14. The light valve for guiding light of claim 1, wherein the second end is a concave mirror.

15. The light valve for guiding light of claim 1, wherein the second end is coated with a reflective coating.

16. The light valve for guiding light of claim 1, wherein the second end is a cylindrical mirror.

17. The light valve for guiding light of claim 16, wherein the optical axis of the cylindrical mirror is orthogonal to the surface normal of the first light guiding surface.

18. The light valve for guiding light of claim 1, wherein each extraction feature has a surface normal direction to direct at least some of the light propagating in the second direction to be extracted in a direction outside the light valve.

19. The light valve for guiding light of claim 1, wherein the extracted light passes from the extraction feature, and exits from the light valve through the first light guiding surface.

20. The light valve for guiding light of claim 1, further comprising illumination elements for generating light to enter at the first end of the light valve, wherein the second light guiding surface is configured so that light from the illumination elements are incident on the light extracting features after reflecting from the second end.

21. The light valve for guiding light of claim 1, wherein the plurality of extraction features further comprise:

a first region wherein the extraction features of the first region have a first orientation; and

a second region wherein the extraction features of the second region have a second orientation, wherein the first orientation and the second orientations are different from one another.

22. The light valve for guiding light of claim 1, wherein the first light guiding surface and the second light guiding surface are transparent.

23. The light valve for guiding light of claim 1, wherein the orientation of the extraction features varies across the light valve from the first end to the second end.

24. The light valve for guiding light of claim 1, further comprising a vertical diffuser, wherein the vertical diffuser further comprises an asymmetric scattering surface.

25. The light valve for guiding light of claim 1, wherein light extraction is achieved by refraction at the extraction features of the light valve.