WHAT IS CLAIMED IS:

1. A laser beam spot shape correcting method for correcting a spot shape of a laser beam condensed by a condensing lens in a laser processing apparatus,

the laser processing apparatus including

a chuck table configured to hold a workpiece,

a laser beam irradiating unit configured to irradiate the workpiece held on the chuck table with the laser beam, and

a control unit,

the laser beam irradiating unit including

a laser oscillator,

the condensing lens configured to condense the laser beam emitted from the laser oscillator, and

a spatial light modulator disposed between the laser oscillator and the condensing lens,

the method comprising:

a concave mirror disposing step of positioning a concave mirror having a reflecting surface as a spherical surface at a position facing the condensing lens of the laser beam irradiating unit;

a focal point positioning step of positioning a condensing point of the condensing lens at a focal point position of the concave mirror after the concave mirror

disposing step;

a laser beam irradiating step of irradiating the concave mirror with the laser beam condensed by the condensing lens by actuating the laser oscillator;

an imaging step of imaging reflected light reflected by the reflecting surface of the concave mirror by an imaging unit;

an image forming step of forming an XZ plane image or a YZ plane image from an XY plane image depicting a shape and an intensity distribution of the laser beam imaged in the imaging step; ~~and~~

a comparing step of comparing the image formed in the image forming step with an XZ plane image or a YZ plane image of a laser beam having an ideal shape and an ideal intensity distribution; and

a determining step of determining which aberration component is included in the image of the laser beam imaged in the imaging step,

a phase pattern displayed on a display unit of the spatial light modulator being changed such that the XZ plane image or the YZ plane image formed in the image forming step coincides with the XZ plane image or the YZ plane image of the laser beam having the ideal shape and the ideal intensity distribution,

wherein the phase pattern that cancels out the aberration component determined in the determining step is displayed on the display unit of the spatial light modulator.

~~2. The laser beam spot shape correcting method according to claim 1, further comprising:~~

~~a determining step of determining which aberration component is included in the image of the laser beam imaged in the imaging step, wherein~~

~~a phase pattern that cancels out the aberration component determined in the determining step is displayed on the display unit of the spatial light modulator.~~

2~~3~~. A laser beam spot shape correcting method for correcting a spot shape of a laser beam condensed by a condensing lens in a laser processing apparatus,

the laser processing apparatus including

a chuck table configured to hold a workpiece,

a laser beam irradiating unit configured to irradiate the workpiece held on the chuck table with the laser beam, and

a control unit,

the laser beam irradiating unit including

a laser oscillator,

the condensing lens configured to condense

the laser beam emitted from the laser oscillator, and

a spatial light modulator disposed between the laser oscillator and the condensing lens,

the method comprising:

a concave mirror disposing step of positioning a concave mirror having a reflecting surface as a spherical surface at a position facing the condensing lens of the laser beam irradiating unit;

a focal point positioning step of positioning a condensing point of the condensing lens at a focal point position of the concave mirror after the concave mirror disposing step;

a laser beam irradiating step of irradiating the concave mirror with the laser beam condensed by the condensing lens by actuating the laser oscillator;

an imaging step of imaging reflected light reflected by the reflecting surface of the concave mirror by an imaging unit;

an image forming step of forming an XZ plane image or a YZ plane image from an XY plane image depicting a shape and an intensity distribution of the laser beam imaged in the imaging step; and

a comparing step of comparing the image formed in the image forming step with an XZ plane image or a YZ

plane image of a laser beam having an ideal shape and an ideal intensity distribution;

a determining step of determining which aberration component is included in the laser beam imaged in the imaging step; and

a storing step of storing, in advance, which aberration component is included in the laser beam having the ideal shape and the ideal intensity distribution, wherein

a phase pattern displayed on a display unit of the spatial light modulator being changed such that the XZ plane image or the YZ plane image formed in the image forming step coincides with the XZ plane image or the YZ plane image of the laser beam having the ideal shape and the ideal intensity distribution, and

the phase pattern displayed on the display unit of the spatial light modulator is changed such that the aberration component of the laser beam imaged in the imaging step coincides with the aberration component of the ideal laser beam.

~~The laser beam spot shape correcting method according to claim 1, further comprising:~~

~~a determining step of determining which aberration component is included in the laser beam imaged in the~~

~~imaging step; and~~

~~a storing step of storing, in advance, which aberration component is included in the laser beam having the ideal shape and the ideal intensity distribution, wherein~~

~~the phase pattern displayed on the display unit of the spatial light modulator is changed such that the aberration component of the laser beam imaged in the imaging step coincides with the aberration component of the ideal laser beam.~~

3~~4~~. A laser beam spot shape correcting method for correcting a spot shape of a laser beam condensed by a condensing lens in a laser processing apparatus,

the laser processing apparatus including

a chuck table configured to hold a workpiece,

a laser beam irradiating unit configured to irradiate the workpiece held on the chuck table with the laser beam, and

a control unit,

the laser beam irradiating unit including

a laser oscillator,

the condensing lens configured to condense the laser beam emitted from the laser oscillator, and

a spatial light modulator disposed between

the laser oscillator and the condensing lens,

the method comprising:

a concave mirror disposing step of positioning a concave mirror having a reflecting surface as a spherical surface at a position facing the condensing lens of the laser beam irradiating unit;

a focal point positioning step of positioning a condensing point of the condensing lens at a focal point position of the concave mirror after the concave mirror disposing step;

a laser beam irradiating step of irradiating the concave mirror with the laser beam condensed by the condensing lens by actuating the laser oscillator;

an imaging step of imaging reflected light reflected by the reflecting surface of the concave mirror by an imaging unit;

an image forming step of forming an XZ plane image or a YZ plane image from an XY plane image depicting a shape and an intensity distribution of the laser beam imaged in the imaging step; and

a comparing step of comparing the image formed in the image forming step with an XZ plane image or a YZ plane image of a laser beam having an ideal shape and an ideal intensity distribution;

a phase pattern displayed on a display unit of the spatial light modulator being changed such that the XZ plane image or the YZ plane image formed in the image forming step coincides with the XZ plane image or the YZ plane image of the laser beam having the ideal shape and the ideal intensity distribution,

wherein

in the comparing step, when a difference between the compared images is equal to or less than a predetermined rate, the difference is determined to be acceptable, and

when the difference is larger than the predetermined rate, the spot shape is corrected again.

~~The laser beam spot shape correcting method according to claim 1, wherein~~

~~in the comparing step, when a difference between the compared images is equal to or less than a predetermined rate, the difference is determined to be acceptable, and~~

~~when the difference is larger than the predetermined rate, the spot shape is corrected again.~~