WHAT IS CLAIMED IS:

1. A laser processing apparatus comprising:

a chuck table for holding a workpiece thereon;

a laser beam applying unit for applying a laser beam having a wavelength transmittable through the workpiece held on the chuck table to the workpiece while positioning a focused point of the laser beam within the workpiece, thereby forming modified layers in the workpiece; and

a feed mechanism for processing-feeding the chuck table and the laser beam applying unit relatively to each other, wherein

the laser beam applying unit includes

a laser oscillator for oscillating a laser and emitting the laser beam,

a spatial light phase modulator for adjusting a phase of the laser beam emitted from the laser oscillator,

a beam condenser for condensing the laser beam whose phase has been adjusted by the spatial light phase modulator and positioning a focused point of the laser beam within the workpiece, and

a control unit for adjusting the spatial light phase modulator, and

the control unit has a storage section storing therein an adjustment pattern table for adjusting the spatial light phase modulator to produce in the workpiece a strongly corrected central area where relatively small aberrations occur and a weakly corrected outer peripheral area where relatively large aberrations occur at the focused point of the laser beam applied to and refracted by the workpiece,

wherein the strongly corrected central area takes up 20% to 30% of a total area of the laser beam emitted from the laser oscillator and is located centrally in the laser beam; and

the weakly corrected outer peripheral area takes up a remainder of the total area of the laser beam around the strongly corrected central area.

~~2. The laser processing apparatus according to claim 1, wherein~~

~~the strongly corrected central area takes up 20% to 30% of a total area of the laser beam emitted from the laser oscillator and is located centrally in the laser beam; and~~

~~the weakly corrected outer peripheral area takes up a remainder of the total area of the laser beam around the strongly corrected central area.~~

2~~3~~. The laser processing apparatus according to claim 1, wherein

the adjustment pattern table includes a plurality of adjustment patterns according to which the spatial light phase modulator is to be adjusted depending on depths where the focused point of the laser beam is to be positioned within the workpiece, and selects one of the adjustment patterns according to a depth of a focused point indicated by an operator of the laser processing apparatus.

3. The laser processing apparatus according to claim 1, wherein

the spatial light phase modulator is adjusted by a separate dedicated control unit.

4. The laser processing apparatus according to claim 1, wherein

a degree of strength of correction with respect to the strongly corrected central area and the weakly corrected outer peripheral area is established on a basis of a fringe Zernike polynomial, expressed using a polar coordinate (r, θ), where r represents a radius of a unit circle and θ represents a rotational angle; and

a ninth term of the fringe Zernike polynomial, represented by [Z9], is indicated by an equation

$$[Z9] = 6r^4 - 6r^2 + 1,$$

which represents a spherical aberration.

5. The laser processing apparatus according to claim 4, wherein

the strongly corrected central area that is strongly corrected by the spatial light phase modulator serves to correct an aberration at the depth where the focused point of the laser beam is to be positioned within the workpiece with a strong correction so as to make the aberration as close to zero as possible; and

the weakly corrected outer peripheral area that is weakly corrected by the spatial light phase modulator is calculated to make values of coefficients of the ninth term of the fringe Zernike polynomial larger than those according to the strong correction by approximately 0.05 to 0.09, or preferably by approximately 0.07.