CLAIMS

~~What is claimed is:~~

1. A method for displaying a picture of a virtual environment, performed by a computer device, the method comprising:

displaying a first virtual environment picture, the first virtual environment picture being a picture obtained by observing the virtual environment by using a first observation position as an observation center, the first virtual environment picture displaying a master virtual character at a first position in the virtual environment, and the first observation position being determined according to the first position;

displaying a second virtual environment picture, the second virtual environment picture being a picture obtained by observing the virtual environment by using a second observation position as the observation center, the second virtual environment picture displaying the master virtual character at a second position and ~~a~~ at least one target virtual character at a third position in the virtual environment, and the second observation position being determined according to the second position;

determining, in response to the at least one target virtual character being located in a target region, an offset of the observation center according to a position of the third position in the target region, the target region being a region determined according to the second position of the master virtual character; wherein the target region comprises a region centered on the second position, and the target region is divided into a first quadrant region, a second quadrant region, a third quadrant region, and a fourth quadrant region by a rectangular coordinate system with an x-axis and a z-axis that is established by using the second position as a coordinate origin, and determining the offset of the observation center comprises:

determining, in response to the third position being located in a right region of the z-axis, a horizontal coordinate of the offset as A, A being a positive number, the right region of the z-axis comprising: a positive semi-axis of the x-axis, the first quadrant region, and the fourth quadrant region;

determining, in response to the third position being located in a left region of the z-axis, the horizontal coordinate of the offset as –B, B being a positive number, the left region of the z-axis comprising: a negative semi-axis of the x-axis, the second quadrant region, and the third quadrant region;

determining, in response to the third position being located in an upper region of the x-

axis, a longitudinal coordinate of the offset as C, C being a positive number, the upper region of the x-axis comprising: a positive semi-axis of the z-axis, the first quadrant region, and the second quadrant region; and

determining, in response to the third position being located in a lower region of the x-axis, the longitudinal coordinate of the offset as –D, D being a positive number, the lower region of the x-axis comprising: a negative semi-axis of the z-axis, the third quadrant region, and the fourth quadrant region;

calculating a third observation position according to the offset and the second observation position; and

displaying a third virtual environment picture according to the third observation position~~in response to the second virtual environment picture displaying the target virtual character~~, the third virtual environment picture being a picture obtained by observing the virtual environment by using the~~a~~ third observation position as the observation center, and the third virtual environment picture displaying the master virtual character at the second position and the at least one target virtual character at the third position in the virtual environment~~, and the third observation position being determined according to the second position and the third position~~.

~~2. The method according to claim 1, wherein displaying the third virtual environment picture in response to the second virtual environment picture displaying the target virtual character comprises:~~

~~determining, in response to the second virtual environment picture displaying the target virtual character, an offset of the observation center according to the third position of the target virtual character;~~

~~calculating the third observation position according to the offset and the second observation position; and~~

~~displaying the third virtual environment picture according to the third observation position.~~

~~3. The method according to claim 2, wherein determining, in response to the second virtual environment picture displaying the target virtual character, the offset of the observation center according to the third position of the target virtual character comprises:~~

~~determining, in response to the target virtual character being located in a target region, the offset of the observation center according to a position of the third position in the target region, the target region being a region determined according to the second position of the master virtual character.~~

~~4. The method according to claim 3, wherein the target region comprises a region centered on~~

~~the second position, and the target region is divided into a first quadrant region, a second quadrant region, a third quadrant region, and a fourth quadrant region by a rectangular coordinate system with an x-axis and a z-axis that is established by using the second position as a coordinate origin; and~~

~~determining, in response to the target virtual character being located in the target region, the offset of the observation center according to the position of the third position in the target region comprises:~~

~~determining, in response to the third position being located in a right region of the z-axis, a horizontal coordinate of the offset as A, A being a positive number, the right region of the z-axis comprising: a positive semi-axis of the x-axis, the first quadrant region, and the fourth quadrant region;~~

~~determining, in response to the third position being located in a left region of the z-axis, the horizontal coordinate of the offset as –B, B being a positive number, the left region of the z-axis comprising: a negative semi-axis of the x-axis, the second quadrant region, and the third quadrant region;~~

~~determining, in response to the third position being located in an upper region of the x-axis, a longitudinal coordinate of the offset as C, C being a positive number, the upper region of the x-axis comprising: a positive semi-axis of the z-axis, the first quadrant region, and the second quadrant region; and~~

~~determining, in response to the third position being located in a lower region of the x-axis, the longitudinal coordinate of the offset as –D, D being a positive number, the lower region of the x-axis comprising: a negative semi-axis of the z-axis, the third quadrant region, and the fourth quadrant region.~~

~~5~~2. The method according to claim ~~4~~1, wherein the at least one target virtual character comprises at least two target virtual characters; and

determining, in response to the third position being located in the right region of the z-axis, the horizontal coordinate of the offset as A; and determining, in response to the third position being located in the left region of the z-axis, the horizontal coordinate of the offset as –B comprises:

determining the horizontal coordinate of the offset as 0 in response to at least one of the target virtual characters being located in the right region of the z-axis and at least one of the target virtual characters being located in the left region of the z-axis.

~~6~~3. The method according to claim ~~4~~1, wherein the at least one target virtual character comprises at least two target virtual characters; and

determining, in response to the third position being located in the upper region of the x-axis, the longitudinal coordinate of the offset as C; and determining, in response to the third position being located in the lower region of the x-axis, the longitudinal coordinate of the offset as –D comprises:

determining the longitudinal coordinate of the offset as 0 in response to at least one of the target virtual characters being located in the upper region of the x-axis and at least one of the target virtual characters being located in the lower region of the x-axis.

~~7~~4. The method according to any one of claims ~~2~~ 1 to ~~6~~3, wherein the first virtual environment picture is a picture of the virtual environment acquired by a camera model disposed at a first camera position in the virtual environment, and the observation center is an intersection point of a ray emitted from a position of the camera model in an observation direction and the virtual environment; and

displaying the third virtual environment picture according to the third observation position comprises:

offsetting the camera model from a second camera position to a third camera position, the second camera position corresponding to the second observation position, and the third camera position corresponding to the third observation position; and

displaying the third virtual environment picture in response to the camera model acquiring the third virtual environment picture at the third camera position.

~~8~~5. The method according to claim ~~7~~4, wherein offsetting the camera model from the second camera position to the third camera position comprises:

offsetting the camera model from the second camera position to the third camera position in a specified movement manner, the specified movement manner comprising any one of uniform motion, difference-based motion, and smooth damping motion.

~~9~~6. The method according to claim ~~7~~4, further comprising:

stopping offsetting the camera model in response to the at least one target virtual character being located in a dogfight region, the dogfight region being determined according to the second position of the master virtual character.

~~10~~7. The method according to any one of claims ~~2~~ 1 to ~~6~~3, further comprising:

timing a buffer duration in response that the at least one target virtual character does not exist in the target region;

setting the offset of the observation center to 0 in response to the buffer duration reaching a time threshold;

calculating a fourth observation position according to the offset and a position of the master virtual character; and

displaying a fourth virtual environment picture according to the fourth observation position, the fourth virtual environment picture displaying the master virtual character.

~~11~~8. The method according to any one of claims 1 to ~~6~~3, wherein the displaying a second virtual environment picture comprises:

displaying the second virtual environment picture in response to the master virtual character moving to the second position;

or

displaying the second virtual environment picture in response to the at least one target virtual character moving to the third position.

~~12~~9. An apparatus for displaying a picture of a virtual environment, comprising:

a display module, configured to display a first virtual environment picture, the first virtual environment picture being a picture obtained by observing the virtual environment by using a first observation position as an observation center, the first virtual environment picture displaying a master virtual character at a first position in the virtual environment, and the first observation position being determined according to the first position;

the display module being further configured to display a second virtual environment picture, the second virtual environment picture being a picture obtained by observing the virtual environment by using a second observation position as the observation center, the second virtual environment picture displaying the master virtual character at a second position and at least one~~a~~ target virtual character at a third position in the virtual environment, and the second observation position being determined according to the second position;

a determining module, configured to determine, in response to the at least one target virtual character being located in a target region, an offset of the observation center according to a position of the third position in the target region, the target region being a region determined according to the second position of the master virtual character, wherein the target region comprises a region centered on the second position, and the target region is divided into a first quadrant region, a second quadrant region, a third quadrant region, and a fourth quadrant region by a rectangular coordinate system with an x-axis and a z-axis that is established by using the second position as a coordinate origin;

the determining module being further configured to: determine, in response to the third position

being located in a right region of the z-axis, a horizontal coordinate of the offset as A, A being a positive number, the right region of the z-axis comprising: a positive semi-axis of the x-axis, the first quadrant region, and the fourth quadrant region; determine, in response to the third position being located in a left region of the z-axis, the horizontal coordinate of the offset as –B, B being a positive number, the left region of the z-axis comprising: a negative semi-axis of the x-axis, the second quadrant region, and the third quadrant region; determine, in response to the third position being located in an upper region of the x-axis, a longitudinal coordinate of the offset as C, C being a positive number, the upper region of the x-axis comprising: a positive semi-axis of the z-axis, the first quadrant region, and the second quadrant region; and determine, in response to the third position being located in a lower region of the x-axis, the longitudinal coordinate of the offset as –D, D being a positive number, the lower region of the x-axis comprising: a negative semi-axis of the z-axis, the third quadrant region, and the fourth quadrant region;

a calculation module, configured to calculate a third observation position according to the offset and the second observation position; and

the display module being further configured to display a third virtual environment picture according to the third observation position~~in response to the second virtual environment picture displaying the target virtual character~~, the third virtual environment picture being a picture obtained by observing the virtual environment by using the~~a~~ third observation position as the observation center, and the third virtual environment picture displaying the master virtual character at the second position and the at least one target virtual character at the third position in the virtual environment~~, and the third observation position being determined according to the second position and the third position~~.

~~13. The apparatus according to claim 12, further comprising:~~

~~a determining module, configured to determine, in response to the second virtual environment picture displaying the target virtual character, an offset of the observation center according to the third position of the target virtual character;~~

~~a calculation module, configured to calculate the third observation position according to the offset and the second observation position; and~~

~~the display module being further configured to display the third virtual environment picture according to the third observation position.~~

~~14. The apparatus according to claim 13, wherein~~

~~the determining module is further configured to determine, in response to the target virtual~~

~~character being located in a target region, the offset of the observation center according to a position of the third position in the target region, the target region being a region determined according to the second position of the master virtual character.~~

~~15. The apparatus according to claim 14, wherein the target region comprises a region centered on the second position, and the target region is divided into a first quadrant region, a second quadrant region, a third quadrant region, and a fourth quadrant region by a rectangular coordinate system with an x-axis and a z-axis that is established by using the second position as a coordinate origin;~~

~~the determining module is further configured to determine, in response to the third position being located in a right region of the z-axis, a horizontal coordinate of the offset as A, A being a positive number, the right region of the z-axis comprising: a positive semi-axis of the x-axis, the first quadrant region, and the fourth quadrant region;~~

~~the determining module is further configured to determine, in response to the third position being located in a left region of the z-axis, the horizontal coordinate of the offset as −B, B being a positive number, the left region of the z-axis comprising: a negative semi-axis of the x-axis, the second quadrant region, and the third quadrant region;~~

~~the determining module is further configured to determine, in response to the third position being located in an upper region of the x-axis, a longitudinal coordinate of the offset as C, C being a positive number, the upper region of the x-axis comprising: a positive semi-axis of the z-axis, the first quadrant region, and the second quadrant region; and~~

~~the determining module is further configured to determine, in response to the third position being located in a lower region of the x-axis, the longitudinal coordinate of the offset as −D, D being a positive number, the lower region of the x-axis comprising: a negative semi-axis of the z-axis, the third quadrant region, and the fourth quadrant region.~~

10~~16~~. The apparatus according to claim ~~15~~9, wherein the at least one target virtual character comprises at least two target virtual characters; and

the determining module is further configured to determine the horizontal coordinate of the offset as 0 in response to at least one of the target virtual characters being located in the right region of the z-axis and at least one of the target virtual characters being located in the left region of the z-axis.

~~17~~11. The apparatus according to claim ~~15~~9, wherein the at least one target virtual character comprises at least two target virtual characters; and

the determining module is further configured to determine the longitudinal coordinate of the offset as 0 in response to at least one of the target virtual characters being located in the upper region

of the x-axis and at least one of the target virtual characters being located in the lower region of the x-axis.

~~18~~12. A computer device, comprising a processor and a memory, the memory storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by the processor to implement the method for displaying a picture of a virtual environment according to any one of claims 1 to ~~11~~8.

~~19~~13. A computer-readable storage medium, storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by a processor to implement the method for displaying a picture of a virtual environment according to any one of claims 1 to ~~11~~8.

~~20~~14. A computer program product or a computer program, the computer program product or the computer program comprising computer instructions, the computer instructions being stored in a computer-readable storage medium, a processor of a computer device reading the computer instructions from the computer-readable storage medium, and the processor executing the computer instructions to cause the computer device to perform the method for displaying a picture of a virtual environment according to any one of claims 1 to ~~11~~8.