

WHAT IS CLAIMED IS:

1. An image-capturing apparatus comprising:
an image-capturing device configured to perform image capturing through multiple magnification-variable optical systems to acquire multiple images to be continuously joined together; and
a controller configured to control magnification-varying operations of the respective magnification-variable optical systems,
wherein the controller is configured to, when a first magnification-variable optical system of the multiple magnification-variable optical systems performs the magnification-varying operation to a telephoto side, cause a second magnification-variable optical system thereof to perform the magnification-varying operation to a wide-angle side.
2. An image-capturing apparatus according to claim 1, wherein the first and second magnification-varying optical systems are used for acquiring at least two images to be joined together.
3. An image-capturing apparatus according to claim 1, wherein the image-capturing device is configured to perform image capturing through at least the first and second magnification-varying optical

systems of the multiple magnification-varying optical systems during the magnification-varying operations of the first and second magnification-varying optical systems.

4. An image-capturing apparatus according to claim 1, further comprising a contrast detector configured to detect contrasts of the respective multiple images,

wherein the controller is configured to, when in each of two images to be joined together among the multiple images a first area of a high contrast and a second area of a lower contrast than that of the first area are detected, cause the first and second magnification-variable optical systems to perform the magnification-varying operations so as to form the second areas of the two images as areas to be joined together.

5. An image-capturing apparatus according to claim 1, further comprising a brightness corrector configured to control brightnesses of the multiple images, depending on F-numbers corresponding to magnification-varying states of the multiple magnification-variable optical systems.

6. An image-capturing apparatus according to

claim 1, further comprising moving mechanisms configured to move the respective multiple magnification-variable optical systems in their optical axis directions,

wherein the controller is configured to control the moving mechanisms in response to the magnification-varying operations of the first and second magnification-variable optical systems such that entrance pupils of the multiple magnification-variable optical systems are located on an identical circle.

7. An image-capturing apparatus according to claim 1, wherein the controller is configured to control the magnification-varying operations of the multiple magnification-variable optical systems to set field angles of the respective magnification-variable optical systems to ones corresponding to minimum image-capturing distances at which the field angles have no discontinuity therebetween.

8. An image-capturing apparatus according to claim 1, wherein the following condition is satisfied:

$$\theta < \theta_1/2 + \theta_2/2$$

where θ represents an angle formed between optical axes of the first and second magnification-variable optical systems, and θ_1 and θ_2 respectively represent field angles of the first and second magnification-variable

optical systems.

9. An image-capturing apparatus according to claim 1, further comprising an image producer configured to join the multiple images together to produce a joined image.

10. An image-capturing control method comprising:
a step of performing image capturing through multiple magnification-variable optical systems to acquire multiple images to be continuously joined together; and

a control step of controlling magnification-varying operations of the respective magnification-variable optical systems,

wherein the control step causes, when a first magnification-variable optical system of the multiple magnification-variable optical systems performs the magnification-varying operation to a telephoto side, a second magnification-variable optical system thereof to perform the magnification-varying operation to a wide-angle side.

11. A non-transitory storage medium storing a computer program that causes a computer in an image-capturing apparatus, which is configured to perform image capturing through multiple magnification-variable

optical systems to acquire multiple images to be continuously joined together, to perform a control process for controlling the image-capturing apparatus, the process comprising:

a control step of controlling magnification-varying operations of the respective magnification-variable optical systems,

wherein in the control step the process causes, when a first magnification-variable optical system of the multiple magnification-variable optical systems performs the magnification-varying operation to a telephoto side, a second magnification-variable optical system thereof to perform the magnification-varying operation to a wide-angle side.

12. An image-capturing apparatus comprising:

a main body of the apparatus;

multiple image-capturing devices provided in the main body such that their optical axes mutually intersect at one point and each configured to be capable of performing an optical zoom operation; and

a controller configured to control the optical zoom operations of the image-capturing devices,

wherein:

the image-capturing devices are configured to perform image capturing for acquiring an

omnidirectional image by partially overlapping their field angles; and

the controller is configured to, when a first image-capturing device of the multiple image-capturing devices performs image capturing with the optical zoom operation to a telephoto side for acquiring an enlarged image of a specific object, cause a second image-capturing device of the multiple image-capturing devices to perform the optical zoom operation to a wide-angle side so as to generate no field angle lack between the first and second image-capturing devices, thereby maintaining the image capturing for acquiring the omnidirectional image by the multiple image-capturing devices.

13. An image-capturing apparatus according to claim 12, wherein the multiple image-capturing devices are configured to continuously perform image capturing during the optical zoom operations of the first and second image-capturing devices controlled by the controller.

14. An image-capturing apparatus according to claim 12, further comprising an image producer configured to join together the multiple images acquired by the multiple image-capturing devices including the first and second image-capturing devices

to acquire the omnidirectional image, and to produce the enlarged image of the specific object.

15. An image-capturing apparatus according to claim 14, further comprising an image processor configured to control brightnesses of the multiple images depending on F-numbers corresponding to optical zoom states of the multiple image-capturing devices, and

wherein the image producer is configured to join together the multiple images having the controlled brightnesses to produce the omnidirectional image.

16. An image-capturing apparatus according to claim 12, further comprising moving mechanisms configured to move the respective multiple image-capturing devices in their optical axis directions,

wherein the controller is configured to control the moving mechanisms in response to the optical zoom operations of the first and second image-capturing devices such that entrance pupils of the multiple image-capturing devices are located on an identical circle.

17. An image-capturing apparatus according to claim 12, wherein the multiple image-capturing devices are provided at equal intervals around the main body.

18. An image-capturing apparatus according to claim 12, wherein the controller is configured to cause the first and second image-capturing devices to simultaneously perform their optical zoom operations.