What is claimed is:

1. A polishing apparatus, comprising:

a polishing table configured to support a polishing pad;

a polishing head configured to press a substrate against the polishing pad;

a non-contact type pad-temperature regulating device arranged above the polishing pad;

a pad-temperature measuring device configured to measure a surface temperature of the polishing pad, the pad-temperature measuring device being arranged adjacent to the pad-temperature regulating device and on a downstream side of the pad-temperature regulating device in a rotation direction of the polishing table;

an atomizer configured to clean a polishing surface of the polishing pad; and

a controller configured to control the pad-temperature regulating device based on the surface temperature of the polishing pad measured by the pad-temperature measuring device,

wherein the pad-temperature measuring device is arranged on the downstream side of the pad-temperature regulating device and on an upstream side of the atomizer, and

wherein when a region between the atomizer and the pad-temperature regulating device is defined as a temperature control stable region, the pad-temperature measuring device is arranged in the temperature control stable region, and the polishing head is arranged in a region outside the temperature control stable region.

2. The polishing apparatus according to claim 1, wherein the pad-temperature regulating device comprises an infrared heater configured to radiate infrared rays to a surface of the polishing pad.

3. The polishing apparatus according to claim 2, wherein the pad-temperature regulating device comprises a reflector configured to reflect the infrared rays radiated from the infrared heater toward the polishing pad.

4. The polishing apparatus according to any one of claims 1 to 3, wherein the pad-temperature regulating device comprises a suction nozzle configured to decrease an ambient temperature by sucking hot air adjacent to a surface of the polishing pad.

5. The polishing apparatus according to any one of claims 1 to 4, wherein the pad-temperature regulating device comprises a fan configured to form a flow of air toward a surface of the polishing pad.

6. The polishing apparatus according to any one of claims 1 to 5, wherein the pad-temperature regulating device comprises a plurality of infrared heaters arranged in a radial direction of the polishing pad, and

wherein the controller individually controls each of the infrared heaters to partially change the surface temperature of the polishing pad.

7. The polishing apparatus according to any one of claims 1 to 6, further comprising: a film-thickness measuring device configured to measure a film thickness of the substrate, and

wherein the controller determines a target temperature of the polishing pad based on the film thickness of the substrate measured by the film-thickness measuring device to control the pad-temperature regulating device based on the determined target temperature.

8. The polishing apparatus according to any one of claims 1 to 7, wherein the pad-temperature regulating device comprises a heating fluid nozzle configured to spray a heating fluid onto a surface of the polishing pad.

9. A polishing apparatus, comprising:

a polishing table configured to support a polishing pad;

a polishing head configured to press a substrate against the polishing pad;

a non-contact type pad-temperature regulating device arranged above the polishing pad;

a pad-temperature measuring device configured to measure a surface temperature of the polishing pad, the pad-temperature measuring device being arranged adjacent to the pad-temperature regulating device and on a downstream side of the pad-temperature regulating device in a rotation direction of the polishing table; and

a controller configured to control the pad-temperature regulating device based on the surface temperature of the polishing pad measured by the pad-temperature measuring device;

wherein the pad-temperature regulating device comprises:

a heating fluid nozzle configured to spray a heating fluid onto a surface of the polishing pad; and

a suction nozzle configured to suck a heat of the surface of the polishing pad;

wherein the heating fluid nozzle comprises a plurality of supply ports arranged around a suction port of the suction nozzle so that the heating fluid flows toward the suction port of the suction nozzle.

10. The polishing apparatus according to claim 9, wherein the supply ports are inclined at a predetermined angle toward the suction port of the suction nozzle so that swirling flows toward the suction port of the suction nozzle are formed by the heating fluid.

11. The polishing apparatus according to claim 9 or 10, wherein the controller controls the pad-temperature regulating device so that a flow rate of the fluid sucked by the suction nozzle is equal to or higher than a flow rate of the heating fluid supplied from the heating fluid nozzle.

12. The polishing apparatus according to any one of claims 1 to 11, wherein the

pad-temperature regulating device comprises a cooling device configured to cool a surface of the polishing pad.