running dry or cavitation, resulting in a significant drop in the cooling capacity of the entire cooling system.

Particularly, in a data center or the like where plural servers and network devices are arranged, as heat is generated accompanying processes by respective devices, it is required to always maintain the inside of an air conditioning room at a constant temperature. That is, in a data center or the like, it is necessary to surely prevent breakdown of a main pump (coolant pump).

In this situation, embodimentsan object of the present invention seekis to provide a cooling system and a cooling method that may enable preventing breakdown of a coolant pump.

In order to solve an object as described above, according to the present invention, a cooling system includes: a coolant liquid detection unit for individually detecting whether or not a liquid level of coolant liquid stored in a coolant liquid storage section is higher than or equal to respective plural heights including a first height and a second height higher than the first height in the coolant liquid storage section; and a control unit that changes a rotation speed of a motor of a coolant pump, corresponding to a detection result that is input from the coolant liquid detection unit.According to an aspect of the present invention, there is provided a cooling system comprising: an evaporator for evaporating a coolant by heat exchange with indoor air that is an object of air conditioning; a condenser for cooling and thereby condensing the coolant evaporated by the evaporator; a coolant liquid storage section that communicates with the condenser and stores the coolant liquid flowing in from the condenser; a coolant pump that communicates with the coolant liquid storage section and pressure-transmits the coolant liquid toward the evaporator, the coolant liquid flowing in from the coolant liquid storage section; a pressure difference sensor arranged at the coolant liquid storage section to output a difference between pressures as a detection value for detecting whether or not a liquid level of the coolant liquid is stored in the coolant liquid storage section up to a first height or up to a second height higher than the first height in the coolant liquid storage section; and a control unit that changes a rotation speed of a motor of the

coolant pump, corresponding to the detection value that is input from the pressure difference sensor, wherein the control unit: stops rotation of the motor when a detection value by the pressure difference sensor has become lower than or equal to a first pressure that is a pressure at a time when coolant liquid is stored up to the first height; and thereafter resumes rotation of the motor when a detection value by the pressure difference sensor has become higher than or equal to a second pressure that is a pressure at a time when coolant liquid is stored up to the second height.

According to another aspect of the present invention, there is provided a cooling method for a cooling system, wherein the cooling system includes: an evaporator for evaporating a coolant by heat exchange with indoor air that is an object of air conditioning; a condenser for cooling and thereby condensing the coolant evaporated by the evaporator; a coolant liquid storage section that communicates with the condenser and stores the liquid flowing in from the condenser; a coolant pump that communicates with the coolant liquid storage section and pressure-transmits the coolant liquid toward the evaporator, the coolant liquid flowing in from the coolant liquid storage section; a pressure difference sensor arranged at the coolant liquid storage section to output a difference between pressures as a detection value for detecting whether or not a liquid level of the coolant liquid is stored in the coolant liquid storage section up to a predetermined height; and a control unit, the cooling method comprising the steps of: detecting, from the detection value output from the pressure sensor, whether or not a liquid level of the coolant liquid is stored in the coolant liquid storage section up to a first height or up to a second height higher than the first height in the coolant liquid storage section; liquid storage section up to a first height or up to a second height higher than the first height in the coolant liquid storage section; and changing, by the control unit, a rotation speed of a motor of the coolant pump, corresponding to a detection value that is input from the pressure difference sensor wherein the step of changing comprises: stopping, by the control unit, rotation of the motor when a detection value by the pressure difference sensor has become lower than or equal to a first pressure that is a pressure at a time when coolant liquid is stored up to the first height; and resuming

thereafter, by the control unit, rotation of the motor when a detection value by the pressure difference sensor has become higher than or equal to a second pressure that is a pressure at a time when coolant liquid is stored up to the second height.

According to embodiments of the present invention, it is possible to provide a cooling system and a cooling method that may enable preventing breakdown of a coolant pump.

## Brief Description of the Drawings

FIG. 1 is a configuration diagram of a cooling system in a first embodiment according to the present invention;

FIG. 2 is a flowchart showing a process in controlling drive of a coolant pump, based on signal from liquid level sensors;

FIG. 3 is a configuration diagram of a cooling system in a second embodiment according to the present invention;

FIG. 4 is a configuration diagram of a cooling system in a third embodiment according to the present invention;

FIGS. 5A and 5B are illustrations showing other examples of liquid level sensors used in cooling systems according to the invention, wherein