[0097] When the steady latent heat load Ql is greater than the first latent heat threshold Ql1, or more specifically, when any high-humidity condition is satisfied, the determiner 530 then compares the steady sensible heat load Qs with each of sensible heat thresholds Qs1 to Qs3. The three sensible heat thresholds Qs1 to Qs3 are set in advance to satisfy Qs1 > Qs2 > Qs3.

[0098] High-Humidity Condition 1

A high-humidity condition in which the steady sensible heat load Qs is greater than the first sensible heat threshold Qs1 corresponds to when the outside temperature To or the window temperature Tw is relatively high. Under this condition, the room temperature Ti is more likely to increase. In this case, maintaining the room temperature Ti at the set temperature Tm mainly uses the cooling efficiency rather than the dehumidification efficiency. The determiner 530 thus determines (A) cooling to be the operation mode to be executed by the air-conditioning device 1.

[0099] High-Humidity Condition 2

A high-humidity condition in which the steady sensible heat load Qs is smaller than the first sensible heat threshold Qs1 and greater than the second sensible heat threshold Qs2 involves less cooling efficiency than in the high-humidity condition 1. The determiner 530 thus determines C1 low-cooling dehumidification, serving as a first dehumidification mode, to be the operation mode to be executed by the air-conditioning device 1. In this case, the determiner 530 increases the dehumidification efficiency while lowering the cooling efficiency further than in the high-humidity condition 1.

[0100] High-Humidity Condition 3

A high-humidity condition in which the steady sensible heat load Qs is smaller than the second sensible heat threshold Qs2 and greater than the third sensible heat threshold Qs3 involves less cooling efficiency than in the high-humidity condition 2. In this case, the determiner 530 determines the operation mode to be executed by the air-conditioning device 1 as a second dehumidification mode. The second

and humidity differences ΔT and ΔRH.

[0169] Using the temperature and humidity differences ΔT and ΔRH eliminates the use of information about the outside temperature To, the window temperature Tw, and the outside-air humidity RHo for both determination and switching of the operation mode. Thus, the interior space 71 can be air-conditioned by switching the operation mode with a simpler structure. In particular, when the unsteady sensible heat load Ps and the unsteady latent heat load Pl are dominant over the steady sensible and latent heat loads Qs and Ql, the operation mode is determined based on the temperature and humidity differences ΔT and ΔRH. Thus, air-conditioning can be performed by appropriately switching the operation mode.

[0170] The determiner 530 may perform determination based on the steady sensible and latent heat loads Qs and Ql shown in FIG. 6 and determination based on the temperature and humidity differences ΔT and ΔRH shown in FIG. 15 in combination using AND or OR conditions. In this case, the air-conditioning controller 540 switches the operation mode between the cooling and dehumidification modes and between the cooling and air-blowing modes based on both the temperature difference ΔT and the steady sensible heat load Qs, and switches the operation mode between the dehumidification mode and the air-blowing mode based on both the humidity difference ΔRH and the steady latent heat load Ql. In some embodiments, the determiner 530 may determine the operation mode based on the sensible heat capacity that is the sum of the unsteady and steady sensible heat loads Ps and Qs, or the latent heat capacity that is the sum of the unsteady latent heat load Pl and the steady latent heat load Ql. Switching the operation mode by appropriately combining the determination based on the temperature and humidity differences ΔT and ΔRH and determination based on the steady sensible and latent heat loads Qs and Ql can reduce the frequency of operation mode switching, changes in the room temperature Ti, and changes in the indoor humidity RHi. This structure can thus provide both comfort and energy saving.

510. More specifically, the learner 570 learns, as the heat characteristics of the interior space 71, the relationship between the steady sensible heat load Qs, the room temperature Ti, the outside temperature To, and the window temperature Tw, and estimates α, β, and Qn in formula (3) above. The estimator 520 estimates the steady sensible heat load Qs from formula (3) using α, β, and Qn learned by the learner 570. For ease of understanding, the room temperature Ti is assumed to be equal to the set temperature Tm, and the steady sensible heat load Qs is assumed to be equivalent to the air-conditioning capacity of the air-conditioning device 1.

[0190] In formula (3) above, α is a coefficient denoting the heat insulation efficiency of the house 3, and is a proportionality coefficient associated with the transmission and ventilation loads, which are heat loads used in proportional to the temperature difference ΔTio between the outside and room temperatures To and Ti. Here, the second insolation load is also a heat load transmitted through the outer cover, and may be treated similarly to the transmission load. The learner 570 uses an increase ΔTo in the outside temperature To as a parameter corresponding to the second insolation load, and estimates the heat load Q using an apparent outside temperature To2 (= To + ΔTo) instead of the outside temperature To.

[0191] Without the ventilation load being considering, α is estimated in theory by formula (10) described below using an outer-cover average heat transmission rate UA and an outer-cover surface area A. In formula (10), α is expressed in watt per kelvin (W/K), the outer-cover average heat transmission rate UA is expressed in $W/(m^2 \cdot K)$, and the outer-cover surface area A is expressed in m^2. In addition, 1.000 is a coefficient corresponding to the transmission load, and 0.034 is a coefficient corresponding to the second insolation load. Information on the outer-cover average heat transmission rate UA and the outer-cover surface area A frequently fails to be acquired, and α frequently fails to be accurately acquired from formula (10) below under the ventilation load. In the present embodiment, the learner 570 acquires α using formula (3) above from actual

CLAIMS

1. An air-conditioning device, comprising:

air-conditioning means for air-conditioning a target space, the air-conditioning means including

a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe,

a heat exchanger to cause heat exchange between air in the target space and the refrigerant circulating through the refrigerant pipe, and

a blower to feed air in the target space to the heat exchanger;

acquiring means for acquiring a temperature and a humidity in the target space; and

air-conditioning control means for switching an operation mode, in accordance with the temperature and the humidity acquired by the acquiring means, between a cooling mode in which the air-conditioning means cools the target space, a dehumidification mode in which the air-conditioning means dehumidifies the target space, and an air-blowing mode in which the compressor is stopped without the blower stopping air blowing,

wherein in a case in which a humidity difference between the humidity acquired by the acquiring means and a set humidity in the target space is greater than a first humidity threshold, the air-conditioning control means switches the operation mode to the dehumidification mode when a temperature difference between the temperature acquired by the acquiring means and a set temperature of the target space decreases below a first temperature threshold during air-conditioning of the target space performed by the air-conditioning means in the cooling mode.

2. The air-conditioning device according to claim 1, wherein

in the case in which the humidity difference is greater than the first humidity threshold, the air-conditioning control means switches the operation mode to a second dehumidification mode in which a sensible heat capacity is smaller than in the dehumidification mode when the temperature difference decreases below a second temperature threshold smaller than the first temperature threshold during air-conditioning of the target space performed by the air-conditioning means in the dehumidification mode.

3. The air-conditioning device according to claim 2, wherein

in the case in which the humidity difference is greater than the first humidity threshold, the air-conditioning control means stops the compressor when the temperature difference decreases below a third temperature threshold smaller than the second temperature threshold during air-conditioning of the target space performed by the air-conditioning means in the second dehumidification mode.

4. The air-conditioning device according to any one of claims 1 to 3, wherein

in a case in which a humidity difference between the humidity acquired by the acquiring means and a set humidity in the target space is smaller than a second humidity threshold, the air-conditioning control means switches the operation mode to the air-blowing mode when a temperature difference between the temperature acquired by the acquiring means and a set temperature of the target space decreases below a fourth temperature threshold during air-conditioning of the target space performed by the air-conditioning means in the cooling mode.

5. The air-conditioning device according to claim 4, wherein

in a case in which the temperature difference is smaller than the fourth temperature threshold, the air-conditioning control means switches the operation mode to the dehumidification mode when the humidity difference exceeds a first humidity threshold during air-conditioning of the target space performed by the air-conditioning means in the air-blowing mode.

6. The air-conditioning device according to any one of claims 1 to 5, wherein

the acquiring means further acquires a temperature in an external space external to the target space, and

the air-conditioning control means switches the operation mode between the cooling mode and the dehumidification mode in accordance with a temperature difference between the temperature in the target space acquired by the acquiring means and a set temperature of the target space, and a sensible heat load of the target space defined by the temperature in the external space acquired by the acquiring means.

7. The air-conditioning device according to any one of claims 1 to 6, wherein

the acquiring means further acquires a humidity in an external space external to the target space, and

the air-conditioning control means switches the operation mode between the

dehumidification mode and the air-blowing mode in accordance with a humidity difference between the humidity in the target space acquired by the acquiring means and a set humidity in the target space, and a latent heat load of the target space defined by the humidity in the external space acquired by the acquiring means.

8. A control device for controlling an air-conditioning device to air-condition a target space, the air-conditioning device including a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe, a heat exchanger to cause heat exchange between air in the target space and the refrigerant circulating through the refrigerant pipe, and a blower to feed air in the target space to the heat exchanger, the control device comprising:

acquiring means for acquiring a temperature and a humidity in the target space; and

air-conditioning control means for switching an operation mode, in accordance with the temperature and the humidity acquired by the acquiring means, between a cooling mode in which the air-conditioning device cools the target space, a dehumidification mode in which the air-conditioning device dehumidifies the target space, and an air-blowing mode in which the compressor is stopped without the blower stopping air blowing,

wherein in a case in which a humidity difference between the humidity acquired by the acquiring means and a set humidity in the target space is greater than a first humidity threshold, the air-conditioning control means switches the operation mode to the dehumidification mode when a temperature difference between the temperature acquired by the acquiring means and a set temperature of the target space decreases below a first temperature threshold during air-conditioning of the target space performed by the air-conditioning device in the cooling mode.

9. An air-conditioning method for air-conditioning a target space with a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe, a heat exchanger to cause heat exchange between air in the target space and the refrigerant circulating through the refrigerant pipe, and a blower to feed air in the target space to the heat exchanger, the method comprising:

acquiring a temperature and a humidity in the target space; and

switching an operation mode in accordance with the acquired temperature and the acquired humidity between a cooling mode for cooling the target space, a dehumidification mode for dehumidifying the target space, and an air-blowing mode for

stopping the compressor without stopping air blowing of the blower,

wherein in a case in which a humidity difference between the humidity and a set humidity in the target space is greater than a first humidity threshold, the operation mode is switched to the dehumidification mode when a temperature difference between the temperature and a set temperature of the target space decreases below a first temperature threshold during air-conditioning of the target space in the cooling mode.

10. A program causing a computer to function as acquiring means and air-conditioning control means, the computer being to control an air-conditioning device to air-condition a target space, the air-conditioning device including a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe, a heat exchanger to cause heat exchange between air in the target space and the refrigerant circulating through the refrigerant pipe, and a blower to feed air in the target space to the heat exchanger, wherein

the acquiring means acquires a temperature and a humidity in the target space, and

the air-conditioning control means switches an operation mode in accordance with the temperature and the humidity acquired by the acquiring means between a cooling mode in which the air-conditioning device cools the target space, a dehumidification mode in which the air-conditioning device dehumidifies the target space, and an air-blowing mode in which the compressor is stopped without the blower stopping air blowing,

wherein in a case in which a humidity difference between the humidity acquired by the acquiring means and a set humidity in the target space is greater than a first humidity threshold, the air-conditioning control means switches the operation mode to the dehumidification mode when a temperature difference between the temperature acquired by the acquiring means and a set temperature of the target space decreases below a first temperature threshold during air-conditioning of the target space performed by the air-conditioning device in the cooling mode.

11. An air-conditioning device, comprising:

air-conditioning means for air-conditioning a target space, the air-conditioning means including

a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe,

a heat exchanger to cause heat exchange between air in the target space and

the refrigerant circulating through the refrigerant pipe, and

a blower to feed air in the target space to the heat exchanger;

acquiring means for acquiring a temperature and a humidity in the target space; and

air-conditioning control means for switching an operation mode, in accordance with the temperature and the humidity acquired by the acquiring means, between a cooling mode in which the air-conditioning means cools the target space, a dehumidification mode in which the air-conditioning means dehumidifies the target space, and an air-blowing mode in which the compressor is stopped without the blower stopping air blowing,

wherein in a case in which a humidity difference between the humidity acquired by the acquiring means and a set humidity in the target space is smaller than a second humidity threshold, the air-conditioning control means switches the operation mode to the air-blowing mode when a temperature difference between the temperature acquired by the acquiring means and a set temperature of the target space decreases below a fourth temperature threshold during air-conditioning of the target space performed by the air-conditioning means in the cooling mode.

12. An air-conditioning device, comprising:

air-conditioning means for air-conditioning a target space, the air-conditioning means including

a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe,

a heat exchanger to cause heat exchange between air in the target space and the refrigerant circulating through the refrigerant pipe, and

a blower to feed air in the target space to the heat exchanger;

acquiring means for acquiring a temperature and a humidity in the target space and a temperature in an external space external to the target space; and

air-conditioning control means for switching an operation mode, in accordance with the temperature and the humidity acquired by the acquiring means, between a cooling mode in which the air-conditioning means cools the target space, a dehumidification mode in which the air-conditioning means dehumidifies the target space, and an air-blowing mode in which the compressor is stopped without the blower stopping air blowing,

wherein the air-conditioning control means switches the operation mode between the cooling mode and the dehumidification mode in accordance with a temperature

difference between the temperature in the target space acquired by the acquiring means and a set temperature of the target space, and a sensible heat load of the target space defined by the temperature in the external space acquired by the acquiring means.

13. An air-conditioning device, comprising:

air-conditioning means for air-conditioning a target space, the air-conditioning means including

a compressor to compress a refrigerant and circulate the refrigerant through a refrigerant pipe,

a heat exchanger to cause heat exchange between air in the target space and the refrigerant circulating through the refrigerant pipe, and

a blower to feed air in the target space to the heat exchanger;

acquiring means for acquiring a temperature and a humidity in the target space and a humidity in an external space external to the target space; and

air-conditioning control means for switching an operation mode, in accordance with the temperature and the humidity acquired by the acquiring means, between a cooling mode in which the air-conditioning means cools the target space, a dehumidification mode in which the air-conditioning means dehumidifies the target space, and an air-blowing mode in which the compressor is stopped without the blower stopping air blowing,

wherein the air-conditioning control means switches the operation mode between the dehumidification mode and the air-blowing mode in accordance with a humidity difference between the humidity in the target space acquired by the acquiring means and a set humidity in the target space, and a latent heat load of the target space defined by the humidity in the external space acquired by the acquiring means.