A washing machine and a dehydrating method thereof enabling to smoothly and stably draining water during dehydration are disclosed. The washing machine in accordance with an embodiment of the present invention includes a tub, a drum rotatably mounted in the tub, and a controller for rotating the drum at a high speed when the laundry is dehydrated, and controlling the drum to be rotated during the high speed rotation at a low speed at least N times so as to prevent the water from being interfered with by an airflow generated during the high speed rotation of the drum and to stably drain water. The dehydrating method in accordance with an embodiment of the present invention includes the steps of rotating a drum provided in a tub at a high speed so as to dehydrate laundry, and rotating the drum during the high speed rotation at a low speed at least N times so as to prevent the water from being interfered with by an airflow generated during the high speed rotation of the drum and to stably drain water.
FIG. 3

- Start

1. High speed dehydration S10
2. Low speed dehydration S20
3. High speed dehydration S30

End
WASHING MACHINE AND DEHYDRATING METHOD THEREOF

[0001] This application claims the benefit of Korean Application No. P2004-53125, filed on Jul. 8, 2004, which is hereby incorporated by reference as if fully set forth herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a washing machine, and more particularly, to a washing machine and a dehydrating method thereof enabling to smoothly and stably drain water during dehydration and a dehydrating method.

[0004] 2. Discussion of the Related Art

[0005] A washing machine is an apparatus for removing contaminants stained on a laundry using functions of detergent and water. Such washing machine is classified into many kinds according to a method of applying impact to the laundry.

[0006] A drum washing machine removes contaminants by rotating a drum so as to drop the laundry and apply impact thereto. A pulsator washing machine removes contaminants using a driving axis vertically mounted therein, and water current generated by rotation of a pulsator coupled with the driving axis.

[0007] When the drum washing machine carries out dehydration and the drum is rotated in a tub at a high speed, airflow is generated by the rotation of the drum. Due to the airflow, a problem is generated that water in the tub moves along an inner wall surface of the tub without being discharged to an outside of the tub and flows back into the drum.

[0008] In addition, when the dehydration is completed and the speed of the drum is reduced, a problem is generated that the moving water flows into the drum and wets the laundry.

SUMMARY OF THE INVENTION

[0009] Accordingly, the present invention is directed to a washing machine and a dehydrating method of the same that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0010] An object of the present invention is to provide a washing machine and a dehydrating method thereof enabling to smoothly and stably drain water during dehydration.

[0011] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from the practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0012] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a washing machine includes a tub, a drum rotatably mounted in the tub, and a controller for rotating the drum at a high speed when the laundry is dehydrated, and controlling the drum to be rotated during the high speed rotation at a low speed at least N times so as to prevent the water from being interfered with by an airflow generated during the high speed rotation of the drum and to stably drain water.

[0013] A dehydrating method for a washing machine includes the steps of rotating a drum provided in a tub at a high speed so as to dehydrate laundry, and rotating the drum during the high speed rotation at a low speed at least N times so as to prevent the water from being interfered with by an airflow generated during the high speed rotation of the drum and to stably drain water.

[0014] In another aspect of the present invention, a washing machine includes a tub, a drum rotatably mounted in the tub, and a controller for controlling the drum so as to perform an untangling step for untangling the laundry by rotating the drum, a balancing step for distributing the laundry evenly in the drum by rotating the drum at a first speed, a dehydrating step for removing water from the laundry in the drum by rotating the drum at a second speed being faster than the first speed, during the dehydrating step, a draining step for smoothly and stably draining water to an outside of the tub, the water dehydrated to the tub, by rotating the drum at least N times at a third speed slower than the second speed.

[0015] A dehydrating method of the washing machine in accordance with a second embodiment of the present invention includes the steps of rotating a drum to untangle laundry within the drum, rotating the drum at a first speed so as to evenly distribute the laundry within the drum, rotating the drum at a second speed higher than the first speed to dehydrate the laundry, and, rotating the drum at a third speed lower than the second speed at least N times so as to stably drain the water from a tub.

[0016] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings,

[0018] FIG. 1 illustrates a cross sectional view of a washing machine in accordance with the present invention,

[0019] FIG. 2 illustrates a block diagram of the washing machine in accordance with the present invention,

[0020] FIG. 3 illustrates a flow chart of a dehydrating method in accordance with a first embodiment of the present invention,

[0021] FIG. 4 illustrates a flow chart of a dehydrating method in accordance with a second embodiment of the present invention,

[0022] FIG. 5 illustrates a graph showing speed of a drum in accordance with the present invention, and
FIG. 6 illustrates a graph showing the speed of the drum in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

Referring to FIG. 3, the exterior of a washing machine 100 in accordance with the present invention includes a case 110. A tub 120 is suspended from the case 110. For this reason, an upper part of the tub 120 is coupled with a damper 150 hinge-coupled with a floor surface of the case 110. A spring 140 and a damper 150 provided as mentioned above not only carry out a role of elastically suspending the tube 120 from the case 110 but also reducing vibration applied to the tube 120 during the operation of the washing machine.

The drum 130 has a plurality of through holes 131 on an outer circumferential surface, and a plurality of tumbler ribs 132 on an inner circumferential surface. Accordingly, during washing, water supplied in the tube 120 moves between the drum 130 and the tube 120 through the through holes 131.

In addition, when the drum 130 is rotated, wash water put into the drum 130 is lifted up and dropped down by the tumbler ribs 132. Accordingly, a large amount of friction and impact energy needed for washing are obtained when the laundry is dropped down by the tumbler ribs 132.

Meanwhile, on a front surface of the case 110, an opening 111 is provided for a user to put or take out the laundry into/from the drum 130, and a door 122 is provided for opening or closing the opening 111. Between the opening 111 of the case 110 and the tub 120, a gasket 113 is provided for preventing water and the laundry in the drum 130 and the tub 120 from leaking.

Besides, a supplying device 160 and a draining device 170 are provided in the case 110. The supplying device 160 includes a supply valve 161, a supply hose 162, a detergent box 163, and a supply bellows 164. The supply valve 161 opens or closes a channel of water supplied from the outside thereof, and the supply hose 162 couples the supply valve 161 with the detergent box 163. The supply bellows 164 couples the detergent box 163 with the tube 120. Accordingly, when the supply valve 161 is opened, water passes through the supply hose 162, the detergent box 163, and the supply bellows 164, and then is supplied into the tube 120. In this instance, the detergent stored in the detergent box 163 is supplied to the water at need.

The draining device 170 includes a drain bellows 171, a drain pump 172, and a drain hose 173. In this case, the drain bellows 171 couples the tube 120 with the drain pump 172. A first end of the drain hose 173 is coupled with the drain pump 172, and a second end thereof is communicated with the outside of the case 110. Accordingly, when the drain pump 172 starts operating, the water in the tube 120 passes through the drain bellows 171, the drain pump 172, and the drain hose 173, and then discharged outside.

Meanwhile, to rotate the drum 130, a motor 180 is provided in the case 110, more particularly under the tube 120. A pulley 200 and a driving force transmitting member 190 are provided for transmitting a turning force of the motor 180 to the drum 130. The pulley 200 is coupled with an axis 133 formed at a rear of the drum 130 so as to provide the turning force to the drum 130, the turning force generated from the motor 180, and coupled with the motor 180 via the driving force transmitting member 190. In this case, the driving force transmitting member 190 includes a belt.

In addition, the washing machine 100, though not illustrated in FIG. 1, includes a controller 300 for controlling each part of the washing machine 100 by calculating commands inputted from a key input unit 400 for inputting commands of a user. Particularly, the controller 300 controls rotation frequency of the drum 130 by controlling the motor 180. Hereinafter, the key input unit 400 and the controller 300 will be described in more detail.

The key input unit 400 is generally located at an upper part of the washing machine 100, and includes an input device such as a button for a user to input. The key input unit 400 further includes a display member (not shown) for showing a user the current state of the washing machine 100. In this case, the state of the washing machine 100 indicates an operating state, such as washing or dehydrating, of the washing machine.

The controller 300 is mounted in the case. The controller 300 performs a washing or dehydrating by controlling each part of the washing machine 100. To do this, the controller 300 is electrically coupled with each part of the washing machine 100 so as to receive commands inputted from the key input unit 400 by the user and perform the commands inputted by controlling each part of the washing machine 100. In this case, the washing machine 100 includes the motor 180, a drum 130, a supplying device 160, a draining device 170, an eccentricity measuring unit 320, and a speed sensing unit 310.

The eccentricity measuring unit 320 measures an amount of eccentricity of the drum 130, and reports to the controller 300. The speed sensing unit 310 measures the rotation speed of the drum 130 and reports to the controller 300.

In this case, the eccentricity measuring unit 320 and the speed sensing unit 310 are mounted in the case, more particularly at one of the tub 120, the drum 130 and the motor 180. The controller 300 determines information measured at the speed sensing unit 310 so as to control the rotation speed of the drum 130.

Meanwhile, the controller 300 performs the washing and dehydrating methods as mentioned above. Hereinafter, the dehydrating method will be described in more detail.

FIG. 3 illustrates a dehydrating method of a washing machine 100 in accordance with the present invention. Referring to FIG. 3, the dehydrating method of the washing machine 100 includes the step S10, S30 of rotating the drum 130 at a high speed so as to dehydrate the laundry, and the step S20 of rotating the drum N times at a low speed so as to stably drain the water dehydrated from the laundry to the outside of the tub 120.
[0039] In other words, the controller 300 rotates S10 the drum 130 at a high speed so as to dehydrate the laundry remaining in the drum 130. The water contained in the laundry is moved from the drum 130 to the tub 120 through the hole 131.

[0040] In this case, the drum 130 is rotated at a speed for dehydrating the laundry. In more detail, the drum 130 at the high speed is rotated at a speed more than 300 rpm and less than 450 rpm.

[0041] Meanwhile, when the drum 130 is rotated at the high speed, the water dehydrated to the tub 120 is not drained but moved along an inner wall surface of the tub 120 due to the airflow generated when the drum 130 is rotated. The water flows back into the drum 130 and wets the laundry when the rotation of drum is stopped or the rotation speed of the drum is reduced.

[0042] Accordingly, the drum 130 is rotated S20 N times at the low speed in the process of rotating the drum 130 at the high speed. In this case, the speed of the drum 130 is set at a speed of minimizing airflow generated when the drum 130 is rotated. Then, the water being flowed along the inner wall surface of the tub 120 is not interfered by the airflow but smoothly and stably collected at a lower part of the tub 120 and then drained outside of the tub 120. In other words, when the controller 300, during the dehydration of the laundry, rotates the drum 130 at a low speed at least one time in the middle of rotating the drum 130 at the high speed.

[0043] The airflow generated when the drum 130 is rotated is minimized, and due to the gravity, the water being flowed along the inner wall surface of the tub 120 is smoothly and stably gathered at a lower part of the tub 120 and then drained outside of the tub 120. In this case, the controller 300 sets the rotation speed of the drum 130 at a speed of minimizing the airflow generated when the drum 130 is rotated. Then, the water being flowed along the inner wall surface of the tub 120 is not interfered by the airflow but smoothly and stably gathered at a lower part of the tub 120 and then drained outside of the tub 120.

[0044] Meanwhile, when the drum 130 is rotated at the low speed, the laundry needs to be stuck to the inner wall surface of the drum 130 by centrifugal force. If the laundry is not stuck to the inner wall surface of the drum 130, an eccentric amount of the drum 130 is increased. Accordingly, the laundry is hit against the inner wall surface of the tub 120 when the drum 130 is rotated.

[0045] In other words, the controller 300 rotates the drum 130 at a speed at which the laundry kept being attached on the inner wall surface of the drum 130 by centrifugal force. In this case, the drum 130 is rotated at a speed more than 100 rpm and less than 150 rpm. The drum 130 is then rotated at a high speed so as to remove the water remained in the laundry.

[0046] In the mean time, a frequency of performing the step S20 of rotating the drum 130 at the low speed is determined by at least one of three factors such as the laundry amount, a water amount and a dehydration degree. In other words, the controller 300 determines the frequency for performing the drum 130 at the low speed by referring to one of the laundry amount, the water amount and the dehydration degree.

[0047] A time of performing the step S20 of rotating the drum 130 at the low speed is determined by at least one of three factors such as the laundry amount, the water amount and the dehydration degree. In other words, the controller 300 determines the time of rotating the drum 130 by referring to one of the laundry amount, the water amount and the dehydration degree.

[0048] At the step S20 of rotating the drum 130 at the low speed, a rotation speed of the drum 130 is determined by one of the laundry amount, the water amount and the dehydration degree. In other words, the controller 300 determines the rotation speed of the drum 130 by referring to one of the laundry amount, the water amount and the dehydration degree.

[0049] At the step S20 of rotating the drum 130 at a low speed, one of the performing frequency, the performing time and the rotation speed is determined by one of three factors such as the laundry amount, the water amount, and the dehydration degree.

[0050] In other words, the controller 300 may determine the rotation frequency of the drum 130 rotated at a low speed, considering other factors except the laundry amount and the dehydration degree. In this case, other factors may be the size of the drum 130, the capacity of the washing machine 100, and the kind of the laundry.

[0051] Otherwise, at the step S20 of rotating the drum 130, at least one of N, a time for performing each low speed rotation and the low speed is determined based on weight of the laundry. In this case, the controller 300 determines at least one of N, a time for performing each low speed rotation and the low speed of the drum 130 by referring to the weight of the laundry. In here, the weight of laundry is a weight in an early stage of the step S10 of rotating the drum 130 at the high speed.

[0052] Otherwise, at the step S20 of rotating the drum 130, at least one of N, a time for performing each low speed rotation and the low speed is determined based on a change in weight of laundry. In this case, the controller 300 determines at least one of N, a time for performing each low speed rotation and the low speed of the drum 130 by referring to the change in weight of the laundry. In here, the change in weight of the laundry is difference between a weight in an early stage of the step S10 of rotating the drum 130 at the high speed and a weight after the step S20 of rotating the drum 130 at a low speed.

[0053] FIG. 4 illustrates a dehydrating method of the washing machine 100 in accordance with a second embodiment of the present invention. FIG. 5 and FIG. 6 illustrate speed of the drum 130 in the washing machine 100 in accordance with the second embodiment of the present invention. Hereinafter, the second embodiment of the present invention will be described using appended drawings.

[0054] An untangling step S100 for untangling the laundry is carried out by rotating the drum 130. In this case, the untangling step S100 is for untangling the tangled laundry after washing, so as to distribute the laundry evenly on the inner wall surface. Accordingly, the controller 300 rotates the drum 130 at a speed (for example, 50 rpm) at which the laundry is raised along the inner wall surface and then dropped.
After the untangling step S100, a balancing step S200 is carried out for distributing the laundry evenly inside of the drum 130 by rotating the drum 130. In the balancing step, the controller 300 rotates the drum 130 at a first speed faster than at the untangling step S100. The controller 300 also rotates the drum 130 for a predetermined time at a predetermined speed (for example 110 rpm) so as to evenly distribute the laundry on the inner wall surface of the drum 130, thereby balancing the drum 130.

In the balancing step S200, the eccentricity measuring unit 320 measures the eccentric amount of the drum 130. The controller also controls the rotation speed of the drum 130 by comparing the eccentric amount of the drum 130, measured at the eccentricity measuring unit 320, with a standard eccentric amount.

In more detail, the controller 300 repeatedly carries out the balancing step when the measured eccentric amount of the drum 130 is larger than the standard eccentric amount, and carries out a next step S300 when the eccentric amount of the drum 130 is smaller than the standard eccentric amount.

After the balancing step S200, a dehydrating step S500, S700 is carried out for removing water in the drum 130 by rotating the drum 130 at a second speed faster than the first speed that is the rotation speed of the balancing step S200. In the early stage of the dehydrating step, a large amount of water is dehydrated at a time, a noise is generated, and therefore the motor 180 is overloaded. Accordingly, prior to the dehydrating step, a simple dehydrating step S400 is carried out for slowly or gradually accelerating the drum 130 for a predetermined time.

In the dehydrating step S500, the drum 130 is rotated at a speed enabling smooth dehydration of the laundry. In more detail, the drum 130 is rotated at a speed greater than 300 rpm and less than 450 rpm. In this instance, the water contained in the laundry is dehydrated and then drained to the tub 120 through the through the hole 131 of the drum 130.

Meanwhile, due to the airflow generated when the drum 120 is rotated, the water dehydrated to the tub 120 is not drained but moved along the inner wall surface of the tub 120. When the drum 130 stops rotating or reduces the rotation speed thereof, water is flowed into the drum 130 and wets the laundry.

Accordingly, during the dehydrating step S500, a draining step S600 is carried out by rotating the drum 130 at a third speed slower than the second speed that is the rotation speed of the dehydrating step S500, so as to smoothly and stably flow the water to the outside of the tub 120, the water dehydrated to the tub 120.

In the draining step S600, the drum 130 is rotated at the third speed that is a speed at which the airflow generated during rotation of the drum is minimized. Then, the water flowing along the inner wall surface of the tub 120 is gathered at a lower part of the tub 120, and drained to the outside of the tub 120.

In other words, the controller 300 rotates the drum 130 at the third speed lower than the second speed that of the dehydrating step S500, and thus reduces the rotation speed of the drum 130 at the draining step S600. In other words, the speed of the drum 130 is reduced. Then, the airflow generated when the drum 130 is rotated is minimized, and the water being flowed along the inner wall surface of the tub 120 is smoothly and stably gathered at a lower part of the tub 120 and drained outside thereof.

Meanwhile, at the draining step S600, the controller 300 rotates the drum 130 at a speed at which the airflow generated when the drum 130 is rotated is minimized. Then, the water being flowed along the inner wall surface of the tub 120 is not interfered by the airflow but smoothly and stably gathered at a lower part of the tub 120 and then drained outside of the tub 120.

At the draining step S600, the laundry needs to be stuck to the inner surface of the drum 130 by centrifugal force. If the laundry is not stuck to the inner wall surface of the drum 130, the eccentric amount of the drum 130 is increased. Accordingly, the laundry is hit against the inner wall surface of the tub 120 when the drum 130 is rotated.

In other words, the controller 300 rotates the drum 130 at a speed at which the laundry kept being attached on the inner wall surface of the drum 130 by centrifugal force. In this case, the drum 130 is rotated at a speed more than 100 rpm and less than 150 rpm. The drum 130 is then rotated at a high speed so as to remove the remaining laundry.

Meanwhile, a frequency of performing the draining step S600 is determined by at least one of three factors such as the laundry amount, the water amount and the dehydration degree. In other words, the controller 300 determines the frequency of performing the draining step by referring to at least one of the laundry amount, the water amount and the dehydration degree.

A time of performing the draining step S600 is determined by at least one of three factors such as the laundry amount, the water amount and the dehydration degree. In other words, the controller 300 determines the time of the draining step S600 by referring to at least one of the laundry amount, the water amount and the dehydration degree.

At the draining step S600, the rotation speed of the drum 130 is determined by at least one of three factors such as the laundry amount, the water amount and the dehydration degree. In other words, the controller 300 determines the rotation speed of the drum 130 by referring to at least one of the laundry amount, the water amount and the dehydration degree.

At the draining step S600, one of a performing frequency, a performing time and a rotation speed of the drum 130 is determined by one of the laundry amount, the water amount and the dehydration degree. In other words, in consideration of at least one of two factors such as the amount of the laundry and the degree of dehydration, the controller 300 determines the rotation frequency, the performing time, and the rotation speed of the drum 130 rotated at a low speed.

Meanwhile, the controller 300 may determine the frequency, a performing time and a rotation speed of the draining step by considering other factors except the laundry amount and the dehydration degree. In this case, other
factors may be the size of the drum 130, the capacity of the washing machine 100, and the kind of the laundry.

[0072] Otherwise, at the draining step S600, at least one of N, a time for performing each the third speed rotation and the third speed is determined based on a weight of laundry. In this case, the controller 300 determines at least one of N, a time for performing each the third speed rotation and the third speed of the drum 130 by referring to the weight of laundry. In here, the weight of laundry is a weight in an early stage of the step S500 of rotating the drum 130 at the second speed.

[0073] Otherwise, at the draining step S600, at least one of N, a time for performing each third speed rotation and the third speed is determined based on a change in weight of the laundry. In this case, the controller 300 determines at least one of N, a time for performing each the third speed rotation and the third speed of the drum 130 by referring to the change in weight of the laundry. In here, the change in weight of the laundry is difference between a weight in an early stage of the step S500 of rotating the drum 130 at the second speed and a weight after the step S600 of rotating the drum 130 at a third speed.

[0074] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

1. A dehydrating method for a washing machine, comprising the steps of:
   - rotating a drum provided in a tub at a high speed so as to dehydrate laundry, and
   - rotating the drum during the high speed rotation at a low speed at least N times so as to prevent the water from being interfered with by an airflow generated during the high speed rotation of the drum and to stably drain water.
2. The dehydrating method of claim 1, wherein the low speed is greater than or equal to a speed at which the laundry is stuck to an inner surface of the drum due to a centrifugal force.
3. The dehydrating method of claim 1, wherein the low speed is in the range of 100-150 rpm.
4. The dehydrating method of claim 1, wherein the high speed is in the range of 300-450 rpm.
5. The dehydrating method of claim 1, wherein at least one of N, a time for performing each low speed rotation and the low speed is determined based on weight of the laundry.
6. The dehydrating method of claim 1, wherein at least one of N, a time for performing each low speed rotation and the low speed is determined based on a change in weight of the laundry.
7. A dehydrating method of a washing machine, comprising the steps of:
   - rotating a drum to untangle laundry within the drum,
   - rotating the drum at a first speed so as to evenly distribute the laundry within the drum,
   - rotating the drum at a second speed higher than the first speed to dehydrate the laundry, and,
   - rotating the drum at a third speed lower than the second speed at least N times so as to stably drain the water from a tub.
8. The dehydrating method of claim 7, wherein at the draining step, rotation speed of the drum is a speed that minimizes airflow intensity, so as to prevent from being interfered with by an airflow generated during the rotation of the drum.
9. The dehydrating method of claim 7, wherein at the draining step, the drum is rotated at a speed at which the laundry is stuck to inner surface of the drum due to centrifugal force.
10. The dehydrating method of claim 7, wherein at the draining step, the drum is rotated at a speed in the range of 100-150 rpm.
11. The dehydrating method of claim 7, wherein at the draining step, the drum is rotated at a speed in the range of 300-450 rpm.
12. The dehydrating method of claim 7, wherein at least one of N, a time for performing each the third speed rotation and the third speed is determined based on weight of the laundry.
13. The dehydrating method of claim 7, wherein at least one of N, a time for performing each the third speed rotation and the third speed is determined based on a change in weight of the laundry.
14. A washing machine comprising:
   - a tub,
   - a drum rotatably mounted in the tub, and
   - a controller for rotating the drum at a high speed when the laundry is dehydrated, and controlling the drum to be rotated during the high speed rotation at a low speed at least N times so as to prevent the water from being interfered with by an airflow generated during the high speed rotation of the drum and to stably drain water.
15. The washing machine of claim 14, wherein when the drum is rotated at the low speed, the controller controls the drum to be rotated at a speed at which the laundry is stuck to inner surface of the drum due to a centrifugal force.
16. The washing machine of claim 14, wherein when the drum is rotated at the low speed, the controller controls the drum to be rotated at a speed in the range of 100-150 rpm.
17. The washing machine of claim 14, wherein when the drum is rotated at the low speed, the controller controls the drum to be rotated at a speed in the range of 300-450 rpm.
18. The washing machine of claim 14, wherein the controller determines at least one of N, a time for performing each low speed rotation and the low speed to base on weight of the laundry.
19. The dehydrating method of claim 14, wherein the controller determines at least one of N, a time for performing each low speed rotation and the low speed to base on a change in weight of the laundry.
20. A washing machine comprising:
   - a tub,
   - a drum rotatably mounted in the tub, and
   - a controller for controlling the drum so as to perform:
     - an untangling step for untangling the laundry by rotating the drum,
a balancing step for distributing the laundry evenly in the drum by rotating the drum at a first speed,

a dehydrating step for removing water from the laundry in the drum by rotating the drum at a second speed being faster than the first speed,

during the dehydrating step, a draining step for smoothly and stably draining water to an outside of the tub, the water dehydrated to the tub, by rotating the drum at least N times at a third speed slower than the second speed.

21. The washing machine of claim 20, wherein at the draining step, the controller controls the drum at a speed of minimizing airflow so as to prevent from being interfered with by an airflow generated during the rotation of the drum.

22. The washing machine of claim 20, wherein at the draining step, the controller controls the drum to be rotated at a speed at which the laundry is stuck to inner surface of the drum due to centrifugal force.

23. The washing machine of claim 20, wherein at the draining step, the controller controls the drum to be rotated at a speed in the range of 100-150 rpm.

24. The washing machine of claim 28, wherein at the dehydrating step, the controller controls the drum to be rotated at a speed in the range of 300-450 rpm.

25. The washing machine of claim 20, wherein the controller determines at least one among a performing frequency, a performing time and a rotation speed by weight of laundry at draining step.

26. The dehydrating method of claim 20, wherein the controller determines at least one of N, a time for performing each the third speed rotation and the third speed to base on a change in weight of the laundry.