

[DESCRIPTION]

[Invention Title]

REINFORCED CONCRETE WALL USING TRIANGULAR REBAR NET
ARRANGEMENT AND METHOD FOR INSTALLING SAME

[Technical Field]

The present invention relates to a reinforced concrete wall being formed by preassembling and arranging rebars as triangular rebar nets in a self-supporting triangle structure in a reinforced concrete wall requiring shear reinforcement and a preferable installation method therefor.

[Background Art]

A reinforced concrete structure as a structure in which a rebar and a concrete are integrated is a structure in which the concrete bears compression force and the rebar bears with tensile force and shear force. As an earthquake-proof is reinforced, a bearing wall may be designed in a structure to receive an upper load as axial force and transfer the received upper load to a ground and primarily resist a lateral load such as an earthquake. In particular, an underground outer wall, a core wall, a retaining wall, a wall type pier, and the like are designed as a shear bearing wall which can be resistant the lateral load.

FIG. 1 illustrates a representative example for rebar arrangement details of the shear bearing wall and as illustrated in FIG. 1, a plastic design is general so that a cross tie rebar 12, a tie rebar 13, and the like are arranged in a transverse direction to show a plastic behavior. The transverse rebar (the cross tie rebar 12 and the tie rebar 13) confines the bending rebar (wall axial main rebar 11) to enhance earthquake proof performance and confines compression zone concrete 14 to delay crushing and increase a shear strength. Actually, for the rebar details of the reinforced concrete wall

illustrated in FIG. 1, a highway bridge design code or a concrete structure code are established and widely applied.

However, an arrangement design illustrated in FIG. 1 has a disadvantage that constructability deteriorates. In other words, the cross tie rebar 12 needs to be arranged to cross a wall cross-section in a construction site and the arrangement work is very cumbersome and requires a long work time and further, in some cases, the arrangement work needs to be performed while holding a main rebar 11 with a crane in order to prevent fall-down of the main rebar 11, and as a result, crane use efficiency may deteriorate. Furthermore, the cross tie rebar 12 interferes with an aggregate of the concrete 14 to make concrete placement be difficult, and as a result, poor concrete placement may be caused.

[Disclosure]

[Technical Problem]

The present invention is developed to solve a constructability problem of a reinforced concrete wall in the related art, which is difficult to install due to interference of cross tie rebar arrangement, and the like and the present invention has been made in an effort to provide a reinforced concrete wall having a new rebar arrangement structure, which can achieve simplification of a rebar arranging work.

Further, the present invention has been made in an effort to provide an installation method that can enhance constructability and shorten a construction period through modularization of rebar arrangement as a preferable installation method of the reinforced concrete wall.

[Technical Solution]

In order to solve the technical problem, the present invention provides a reinforced concrete wall, including: a plurality of triangular rebar nets arranged side by

side in the longitudinal direction of a wall; outer transverse rebars arranged so as to simultaneously surround, in the transverse direction, the plurality of triangular rebar nets which are arranged side by side in the longitudinal direction of the wall; and concrete poured such that the triangular rebar nets and the outer transverse rebars are buried. Here, the triangular rebar nets are formed by assembling: two or three first main rebars which are arranged side by side to be positioned on a continued line in the axial direction; one second main rebar disposed to be parallel with and spaced from the first main rebars; and a reinforcement transverse rebar arranged so as to connect the first main rebars and the second main rebar in the transverse direction, thereby confining the first main rebars and the second main rebar in a triangular structure and the triangular rebar nets are arranged side by side while continuously changing the direction thereof in the longitudinal direction of the wall such that the first main rebars and the second main rebar adjoin.

Further, the present invention provides a method for installing a reinforced concrete wall, including: a first step of assembling triangular rebar nets by connecting two or three first main rebars and one second main rebar with a reinforcement transverse rebar; a second step of arranging the plurality of triangular rebar nets side by side while changing the direction in the longitudinal direction of a wall such that the first main rebar and the second main rebar adjoin; and a third step of filling the concrete such that the rebars arranged in the second step are buried.

[Description of Drawings]

FIG. 1 illustrates rebar arrangement details of a reinforced concrete wall in the related art.

FIG. 2 illustrates rebar arrangement details of a reinforced concrete wall according to an exemplary embodiment of the present invention.

FIG. 3 illustrates an example in which a triangular rebar net is applied in various structures as another exemplary embodiment of the reinforced concrete wall according to the present invention.

FIG. 4 illustrates assembly details of the triangular rebar net applied to the reinforced concrete wall according to the present invention.

FIG. 5 illustrates an assembly state of a triangular rebar net using a jig in an installation method of a reinforced concrete wall according to the present invention.

FIG. 6 illustrates various rebar arrangement methods in the installation method of the reinforced concrete wall according to the present invention.

FIG. 7 illustrates an installation state of a guide plate in the installation method of the reinforced concrete wall according to the present invention.

[Explanation of Reference Numerals]

100: Reinforced concrete wall

110a, 110b: Triangular rebar net

111: First main rebar

112: Second main rebar

113: Reinforcement transverse rebar

113a: Closed tie rebar

113b: Spiral tie bar

120: External rebar

130: Outer transverse rebar

140: Concrete

Z1, Z2: Jig

F: Foundation

GP: Guide plate

H: Rebar insertion hole

[Mode for Invention]

Hereinafter, the present invention will be described in detail through the accompanying drawings and preferred embodiments.

FIG. 2 illustrates rebar arrangement details of a reinforced concrete wall according to an exemplary embodiment of the present invention. In the present invention, triangular rebar nets having a triangular structure are arranged, in which two or three first main rebars 111 and one second main rebar 112 and one reinforcement transverse rebar 113 are preassembled in the reinforced concrete wall. In the present invention, the reinforced concrete wall includes a wall designed as a shear bearing wall, such as an underground outer wall, a core wall, a retaining wall, a wall type pier, and the like.

In detail, the reinforced concrete wall 100 according to the present invention is constituted by a plurality of triangular rebar nets 110a and 110b arranged side by side in the longitudinal direction of a wall; outer transverse rebars 130 arranged so as to simultaneously surround, in the transverse direction, the plurality of triangular rebar nets 110a and 110b which are arranged side by side in the longitudinal direction of the wall; and concrete 140 poured such that the triangular rebar nets 110a and 110b and the outer transverse rebars 130 are buried. Here, the triangular rebar nets 110a and 110b are formed by assembling: two or three first main rebars 111 which are arranged side by side to be positioned on a continued line in the axial direction; one second main rebar 112 disposed to be parallel with and spaced from the first main rebars 111; and a reinforcement transverse rebar 113 arranged so as to connect the first main rebars 111 and the second main rebar 112 in the transverse direction, thereby confining the first main rebars 111 and the second main rebar 112 in a triangular structure and the

triangular rebar nets are arranged side by side while continuously changing the direction thereof in the longitudinal direction of the wall such that the first main rebars 111 and the second main rebar 112 adjoin. In the triangular rebar nets 110a and 110b, since the first and second main rebars 111 and 112 show confining stress in a stable triangular structure, the triangular rebar nets 110a and 110b are advantageously resistant to brittle fracture while 3-axis confinement of the concrete, and as a result, earthquake-proof performance is enhanced and a shear strength is increased.

In the present invention, link of the first and second main rebars 111 and 112 and hook end processing of the outer transverse rebar 130 follow general methods (a highway bridge design code, and the like) and further, the reinforcement transverse rebar 113 and the outer transverse rebar 130 are adopted as a closed tie rebar 113a or a spiral tie bar 113b to follow the general methods. In a plastic hinge section, the first and second main rebars 111 and 112 are completely mechanically linked while being not overlapped and linked and in a section other than the plastic hinge section, the first and second main rebars 111 and 112 are not overlapped and linked by exceeding 1/2 of the entire first and second main rebars 111 and 112. Further, while when the outer transverse rebar 130 is adopted as the closed tie rebar, both ends are processed with a 135° hook having an extension length equal to or more than the larger value of the length which is 6 times larger than the diameter and 80 mm, and when the outer transverse rebar 130 is adopted as the spiral tie bar, both ends are processed with the 135° hook having an extension length equal to or more than the larger value of the length which is 6 times larger than the diameter and 80 mm, the hook is arranged to be suspended to the main rebars 111 and 112, while in the plastic hinge section, instead of overlapping link, the main rebars 111 and 112 are mechanically connected or completely welded and linked. Moreover, the hook of the reinforcement transverse

rebar 113 is processed to be suspended to the main rebars 111 and 112 and a position of the hook of the reinforcement transverse rebar 113 is changed so that the hook of the reinforcement transverse rebar 113 is not continuously suspended to the same rebars 111 and 112.

FIG. 2 illustrates an example of installation details for a boundary element of a special rebar concrete shear wall in which two triangular rebar nets 110a having an isosceles triangular structure by three first main rebar 111, one second main rebar 112, and one reinforcement transverse rebar 113 are arranged side by side by changing directions of two triangular rebar nets 110a, while a triangular rebar net 110b having a right-angled triangular structure by two first main rebars 111, one second main rebar 112, and one reinforcement transverse rebar 113 is arranged at one end of the boundary element, and the external main rebar 120 is arranged at the other end of the boundary element. The external main rebar 120 becomes a rebar which is arranged to be surrounded by the outer transverse rebar 130 and buried in the concrete 140 while being arranged side by side so as to be positioned on the continuous line with the first main rebar 111 or the second main rebar 112 outside the triangular rebar nets 110a and 110b. In FIG. 2, the external main rebar 120 is arranged so as to be positioned on the continuous line with the second main rebar 112 outside the triangular rebar net 110a having the isosceles triangular structure.

FIG. 3 illustrates an example in which a triangular rebar net is applied in various structures as another exemplary embodiment of the reinforced concrete wall according to the present invention. FIG. 3(a) illustrates an example in which four triangular rebar nets 110b having the right-angled structure and the outer transverse rebar 130 are arranged by two first main rebars 111, one second main rebar 112, and one reinforcement transverse rebar 113. FIG. 3(b) illustrates an example in which four

triangular rebar nets 110a having the isosceles triangular structure, two external main rebars 120, and outer transverse rebar 130 are arranged by two first main rebars 111, one second main rebar 112, and the reinforcement transverse rebar 113. The triangular rebar nets 110a and 110b may be variously arranged while being assembled in a triangular structure having a different shape from FIGS. 2 and 3, of course.

FIG. 4 illustrates assembly details of the triangular rebar net applied to the reinforced concrete wall according to the present invention. In particular, in FIG. 4(a), it can be seen that the hook of the reinforcement transverse rebar is installed to be alternately suspended on another main rebar so as not to be vertically and continuously suspended on the same main rebar when the closed tie rebar 113a is adopted as the reinforcement transverse rebar.

Meanwhile, the present invention proposes a preferable installation method of the reinforced concrete wall 100 and the installation method of the reinforced concrete wall 100 according to the present invention will be described stepwise with reference to FIGS. 5 to 7. First, the triangular rebar nets 110a and 110b are assembled by connecting two or three first main rebars 111 and one second main rebar 112 with the reinforcement transverse rebar 113 (a first step). The triangular rebar nets 110a and 110b may be simply assembled by using a pair of jigs Z1 and Z2 as illustrated in FIG. 5. That, is the triangular rebar nets 110a and 110b are assembled by connecting the reinforcement transverse rebar 113 while two or three first main rebars 111 and one second main rebar 120 are positionally fixed to the one pair jigs Z1 and Z2.

Next, the triangular rebar nets 110a and 110b and the outer transverse rebar 120 are installed at the position of the wall (a second step). According to a detailed method, this step may be divided into three types as illustrated in FIG. 6. A first method as a method that assembles the triangular rebar nets 110a and 110b and the outer transverse

rebar 130 at the position of the wall as illustrated in FIG. 6(a) has become a method in which the triangular rebar nets 110a and 110b are installed by one installation module. That is, a plurality of triangular rebar nets 110a and 110b is arranged and installed in the longitudinal direction of the wall at the position of the wall and thereafter, the outer transverse rebar 130 surrounds outer surfaces of the triangular rebar nets 110a and 110b.

A second method as a method in which the outer transverse rebar 130 surrounds outer surfaces of the triangular rebar nets 110a and 110b to be assembled to a wall rebar net and thereafter, the wall rebar net is installed at the position of the wall as illustrated in FIG. 6(c) is a method in which the wall rebar net is installed by one installation module. That is, all triangular rebar nets 110a and 110b to be arranged in a predetermined section (for example, the boundary element of a shear wall) in the wall to be installed and the external main rebar 120 depending on a need are arranged, and the outer transverse rebar 130 surrounds the outer surfaces of the triangular rebar nets 110a and 110b and the outer surface of the external main rebar 120 to be assembled to the wall rebar net and thereafter, the wall rebar net is hoisted by a crane and installed at the position of the wall.

A third method as a method acquired by compromising the first and second method described above is a method in which the plurality of triangular rebars 110a and 110b are installed at the position of the wall while being simultaneously hoisted with the crane by means of a dedicated jig as illustrated in FIG. 6(b). That is, the third method has become a method in which the plurality of triangular rebar nets 110a and 110b to be arranged in a predetermined section in the wall are simultaneously hung on the dedicated jig and hoisted by the crane to be installed at the position of the wall and thereafter, the outer transverse rebar 130 surrounds outer surfaces of the triangular rebar nets 110a and 110b. The external main rebar 120 depending on the need is hoisted

while being hung on the dedicated jig to be installed together with the plurality of triangular rebar nets 110a and 110b as illustrated in FIG. 6(b), and although not illustrated, the external main rebar 120 depending on the need may be installed while installing the outer transverse rebar 130.

As described above, in the present invention, since the first and second main rebars 111 and 112 is installed in a self-supporting state by the triangular rebar nets 110a and 110b or the wall rebar net, the first and second main rebars 111 and 112 may be stably installed without a worry of fall-down.

Meanwhile, if the second is executed after a guide plate GP with rebar insertion holes H was buried in the top of a foundation F, the first main rebar 111 or the second main rebar 112 are fitted and installed in the rebar insertion holes H of the guide plate (see FIG. 7), a rebar arranging work may be more easily performed.

Last, the concrete 140 is poured such that the rebars installed in the second step is buried. As a result, the reinforced concrete wall is completed.

Although the present invention has been described in detail with reference to detailed embodiments as above, the embodiments are just used for exemplifying the present invention. Therefore, embodiments substituted, added, and modified within the scope without departing from the technical spirit of the present invention will also be included in the protection range of the present invention defined by the accompanying claims given below.

[Industrial Applicability]

According to the present invention, the following effect can be expected.

First, a sufficient shear reinforcement effect can be achieved by arranging the triangular rebar net having the triangular structure by the two or three first main rebar and one second rebar and the reinforcement transverse rebar in the reinforced concrete

wall. In particular, the triangular rebar net is simply assembled to simplify rebar arrangement on the whole, thereby achieving constructability enhancement, construction period shortening, and reduction of installation cost in installing the reinforced concrete wall.

Second, since the triangular rebar net is simply preassembled in the self-supporting structure to be modularized, a site work can be stably and simply performed without the worry about the fall-down of the rebar in installing the reinforced concrete wall and furthermore, when a crane dedicated jig is used, a rebar arrangement work can be easily performed while simultaneously hoisting multiple triangular rebar nets. As a result, safety can be enhanced and an extra charge of a high-place work can be minimized through minimization of human resources during the high-place work.

[CLAIMS]

[Claim 1]

A reinforced concrete wall using a triangular rebar net arrangement, comprising:

a plurality of triangular rebar nets 110a and 110b which formed by assembling: two or three first main rebars 111 which are arranged side by side to be positioned on a continued line in the axial direction; one second main rebar 112 disposed to be parallel with and spaced from the first main rebars 111; and a reinforcement transverse rebar 113 arranged so as to connect the first main rebars 111 and the second main rebar 112 in the transverse direction, thereby confining the first main rebars 111 and the second main rebar 112 in a triangular structure arranged side by side while continuously changing the direction thereof in the longitudinal direction of the wall such that the first main rebars 111 and the second main rebar 112 adjoin;

outer transverse rebars 130 arranged so as to simultaneously surround, in the transverse direction, the plurality of triangular rebar nets 110a and 110b which are arranged side by side in the longitudinal direction of the wall; and

concrete 140 poured such that the triangular rebar nets and the outer transverse rebars are buried.

[Claim 2]

The reinforced concrete wall using a triangular rebar net arrangement of claim 1, wherein the triangular rebar nets 110a and 110b are configured to be assembled in an isosceles triangular structure 110a by three first rebars 111, or in a right-angled triangular structure 110b by two or three first rebars 111.

[Claim 3]

The reinforced concrete wall using a triangular rebar net arrangement of claim 1,

wherein the reinforcement transverse rebar 113 of the triangular rebar net is provided as a closed tie rebar 113a or a spiral tie bar 113b.

[Claim 4]

The reinforced concrete wall using a triangular rebar net arrangement of any one of claims 1 to 3, further comprising:

an external main rebar 120 which is arranged to be surrounded with the outer transverse rebar 130 and buried in the concrete 140 while being arranged side by side so as to be positioned on the continuous line with the first main rebar 111 or the second main rebar 112 outside the triangular rebar nets 110a and 110b.

[Claim 5]

A method for installing the reinforced concrete wall of any one of claims 1 to 3, the method comprising:

a first step of assembling triangular rebar nets 110a and 110b by connecting a first main rebar 111 and a second main rebar 112 with a reinforcement transverse rebar 113;

a second step of arranging the plurality of triangular rebar nets 110a and 110b side by side while changing the direction in the longitudinal direction of a wall such that the first main rebar 111 and the second main rebar 112 adjoin; and

a third step of pouring the concrete 140 such that the arranged rebars are buried.

[Claim 6]

The method for installing the reinforced concrete wall of claim 5, wherein the first step is executed by connecting the reinforced transverse rebar 113 while two or three first main rebars 111 and one second main rebar 112 are positionally fixed to the one pair jigs Z1 and Z2.

[Claim 7]

The method for installing the reinforced concrete wall of claim 5, wherein the second step is executed while arranging the plurality of triangular rebar nets 110a and 110b at a position of the wall, and surrounding the triangular rebar nets 110a and 110b with the outer transverse rebar 130.

[Claim 8]

The method for installing the reinforced concrete wall of claim 5, wherein the second step is executed while installing a wall rebar net at the position of the wall by hoisting the wall rebar net with a crane after arranging the plurality of triangular rebar nets 110a and 110b, and surrounding the triangular rebar nets 110a and 110b with the outer transverse rebar 130 to be assembled with the wall rebar net.

[Claim 9]

The method for installing the reinforced concrete wall of claim 5, wherein the second step is executed while surrounding external surfaces of the triangular rebar nets 110a and 110b with the outer transverse rebar 130 after simultaneously hanging the plurality of triangular rebar nets 110a and 110b on a dedicated jig and hoisting the triangular rebar nets 110a and 110b with the crane and installing the triangular rebar nets 110a and 110b at the position of the wall.

[Claim 10]

The method for installing the reinforced concrete wall of claim 5, wherein the second step is executed while installing the triangular rebar nets 110a and 110b by fitting and installing the first main rebar 111 or the second main rebar 112 into a rebar insertion hole H of a guide plate after burying the guide plate GP with the rebar insertion hole H in the top of a foundation F.