[Document Type] CLAIMS

1. A joint structure of a steel-pipe pile, which connects a first steel-pipe pile and a second steel-pipe pile in series, the joint structure comprising:

an external fitting end portion which is an opening end of the first steel-pipe pile; and

a column shaped internal fitting end portion which configures a portion inserted into the external fitting end portion on one end of the second steel-pipe pile,

wherein the external fitting end portion includes

a plurality of external fitting convex portions which protrude from an inner circumferential surface of the external fitting end portion toward an inner side in a radial direction of the first steel-pipe pile, and are provided along a circumferential direction of the first steel-pipe pile;

an external fitting groove portion which is formed between the external fitting convex portions adjacent to each other in the circumferential direction of the first steel-pipe pile; and

an external fitting engagement groove which is formed along the circumferential direction at a position of an inner side in an axial direction of the first steel-pipe pile from the external fitting convex portion and the external fitting groove portion on the inner circumferential surface,

the internal fitting end portion includes a plurality of internal fitting convex portions which protrude from an outer circumferential surface of the internal fitting end portion toward an outer side in a radial direction of the second steel-pipe pile, and are provided along a circumferential direction of the second steel-pipe pile,

each of the internal fitting convex portions engages with each of the external fitting convex portions in the external fitting engagement groove after the internal fitting end portion is inserted into the external fitting end portion and the first steel-pipe pile and the second steel-pipe pile are relatively rotated around an axis of the first steel-pipe pile,

the external fitting convex portions and the external fitting groove portions are formed in a plurality of rows along the axial direction of the first steel-pipe pile, and

in at least one set of two rows adjacent to each other among the plurality of rows adjacent to one another, the external fitting convex portions of one row and the external fitting groove portions of the other row are provided to be adjacent in the radial direction of the first steel-pipe pile when viewed in the axial direction of the first steel-pipe pile.

and wherein the internal fitting end portion includes an internal fitting edge which forms a gap between a tip portion of the external fitting end portion and the internal fitting end portion, at the inner side in the axial direction of the second steel-pipe pile, in a state where the internal fitting end portion is inserted into the external fitting end portion,

the external fitting convex portion includes a first tapered portion which is inclined along the circumferential direction of the first steel-pipe pile on an end surface in the inner side in the axial direction of the first steel-pipe pile so that a height in the axial direction of the first steel-pipe pile is approximately the same as a height of the gap,

the external fitting engagement groove includes a second tapered portion which is inclined in the circumferential direction of the first steel-pipe pile to be approximately parallel with the first tapered portion at a portion facing the first tapered portion in the axial direction of the first steel-pipe pile,

the internal fitting convex portion includes a third tapered portion which is inclined along the circumferential direction of the second steel-pipe pile to abut the first tapered portion on an end surface in the inner side in the axial direction of the second steel-pipe pile, and a fourth tapered portion which is inclined along the circumferential direction of the second steel-pipe pile to abut the second tapered portion on an end surface in the outer side in the axial direction of the second steel-pipe pile, and

the first steel-pipe pile and the second steel-pipe pile relatively rotate around the axis of the first steel-pipe pile, the first tapered portion and the third tapered portion abut each other, the second tapered portion and the fourth tapered portion abut each other, the plurality of external fitting convex portions and the plurality of internal fitting convex portions engage with each other, the internal fitting edge and the tip portion abut each other to fill the gap, and the external fitting end portion and the internal fitting end portion are fitted together.

2. The joint structure of a steel-pipe pile according to Claim 1,

wherein the external fitting end portion includes a plurality of step portions formed along the axial direction of the first steel-pipe pile,

the external fitting convex portions and the external fitting groove portions by at least one row are provided in each of the plurality of step portions, and

in two step portions adjacent to each other, the external fitting convex portions of one step portion and the external fitting groove portions of the other step portion are provided to be adjacent in the radial direction of the first steel-pipe pile when viewed in the axial direction of the first steel-pipe pile.

3. The joint structure of a steel-pipe pile according to Claim 2,

wherein in the two step portions adjacent to each other, the external fitting convex portions of the one step portion are provided at all positions adjacent to the external fitting groove portions of the other step portion in the radial direction of the first steel-pipe pile when viewed in the axial direction of the first steel-pipe pile, and

the external fitting convex portions are provided without gaps along the circumferential direction of the first steel-pipe pile when viewed in the axial direction of the first steel-pipe pile.

4. The joint structure of a steel-pipe pile according to Claim 2 or 3,

wherein the first steel-pipe pile is thickened in stages along the axial direction of the first steel-pipe pile, and the plurality of step portions adjacent to one another in the axial direction of the first steel-pipe pile are formed so that the external fitting convex portions of the step portion positioned at an outer side in the axial direction of the first steel-pipe pile and the external fitting groove portions of the step portion positioned at the inner side in the axial direction of the first steel-pipe pile all have approximately the same thickness.

~~5. The joint structure of a steel-pipe pile according to any one of Claims 1 to 4,~~

~~wherein the internal fitting end portion includes an internal fitting edge which forms a gap between a tip portion of the external fitting end portion and the internal fitting end portion, at the inner side in the axial direction of the second steel-pipe pile, in a state where the internal fitting end portion is inserted into the external fitting end portion,~~

~~the external fitting convex portion includes a first tapered portion which is inclined along the circumferential direction of the first steel-pipe pile on an end surface~~

~~in the inner side in the axial direction of the first steel-pipe pile so that a height in the axial direction of the first steel-pipe pile is approximately the same as a height of the gap,~~

~~the external fitting engagement groove includes a second tapered portion which is inclined in the circumferential direction of the first steel-pipe pile to be approximately parallel with the first tapered portion at a portion facing the first tapered portion in the axial direction of the first steel-pipe pile,~~

~~the internal fitting convex portion includes a third tapered portion which is inclined along the circumferential direction of the second steel-pipe pile to abut the first tapered portion on an end surface in the inner side in the axial direction of the second steel-pipe pile, and a fourth tapered portion which is inclined along the circumferential direction of the second steel-pipe pile to abut the second tapered portion on an end surface in the outer side in the axial direction of the second steel-pipe pile, and~~

~~the first steel-pipe pile and the second steel-pipe pile relatively rotate around the axis of the first steel-pipe pile, the first tapered portion and the third tapered portion abut each other, the second tapered portion and the fourth tapered portion abut each other, the plurality of external fitting convex portions and the plurality of internal fitting convex portions engage with each other, the internal fitting edge and the tip portion abut each other to fill the gap, and the external fitting end portion and the internal fitting end portion are fitted together.~~

~~6~~5. A steel-pipe pile comprising the joint structure of a steel-pipe pile according to any one of Claims 1 to ~~5~~4.