Development and Application of Multi-belied Cast-in-place Concrete Pile with a high Push-on and Pull-out Resistance

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A multi-belied cast-in-place concrete pile construction method has been developed in order to obtain a high level of bearing capacity with normal pile. The newly developed multi-belied pile has a shape of some bell enlargements at its axial part and consists of high strength materials such as high-strength concrete of $F_c = 100\text{N/mm}^2$ at its maximum. This piles are applied to super high-rise buildings with a high push-on and pull-out resistance, and also buildings which acts of the buoyancy with a pull-out resistance.

In order to investigate the characteristic of push-on and pull-out resistance behavior of this piles, in-situ full-scale load tests, centrifuge model tests, and numerical analyses are carried out. The investigation of actual-size piles digging out after construction with newly developed earth drill method boring machine was carried out to measure the dimensions and concrete strength of piles. The results indicated that this method of piles controls high construction quality of the piles.