



Application and research of steel slag and coal-dust ash in composite foundation of rammed cast-in situ pile

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Abstract

The comparison experiments were carried out using different proportioning pile body mixture, which is formed by steel slag, fly ash, water and cement, and the optimum proportion of pile body mixture was investigated based on the analysis of the changing laws of composite strength and its corresponding influential factors. The research result has certain directive significance for the application of such composite foundation pipe piles.

1. Introduction

Steel slag and fly ash are industrial waste. It will occupy a large area of farm land and result in environmental pollution, which has becoming one big social public hazard (Zhu, 2003; Liu, 2004; Mason, 1994). However, both of them have very high potential pozzolana activity and good compactibility (Shen *et al.*, 2002; Siavasundaram *et al.*, 1990). A series of reactions of physical chemistry and hydration reaction between steel slag and fly ash with water can be generated by stimulating using appropriate admixture. The material can be cemented and solidified, so as to save some cement. The cement in the concrete occupies 1/5 of the total weight, and 70~80 of the concrete occupies are the sand and gravel aggregate (Wang, 2002; Sloss *et al.*, 1996; Couch, 1994). The manual stress layer is formed after tamping the expansion head filler of the end of pile, whose raw material

was cheap and natural grading steel slag. The traditional aggregate material in concrete was substituted by Steel slag and fly ash. By adding a little cement and admixture and optimization ratio, the lower labeling black concrete pile was formed, which is called expanding end perfusion pile of tamper bottom with Steel slag for short. Rigid composite foundations were formed by common working between pile and inter-pile together with steel-ash cushion and consequently decrease cost. The remarkable social, economic and environmental benefit was obtained by improving the effect mechanism of pile and load transfer characteristics of composite foundation (Dimond and Kilgour, 1986; Zalihe and Tuncer, 2001). The comparison experiments were carried out using different proportioning pile body mixture, which is formed by steel slag, fly ash, water and cement. The strength change rules and influence factors of black concrete pile were studied from the mechanical property and microscopic morphological characteristics. Based on this the optimum proportion of