

Correlation of Sensitive Impact Factors with Changes in Proximate Structures in the Delta Region

Qinghe Zeng^{a,+} Jin Liao^{b,c,+} Jiu Guan^a Feng Gao^{b,c} Cuiying Zhou^{b,c,*} Zhen Liu^{b,c}

(^a China Southern Power Grid EHV Power Transmission Company, Guangzhou 510275, China; gcjzqh@126.com (Q.Z.) ; guanjiu2023@163.com (J.G.)

^b School of Civil Engineering, Sun Yat-sen University, No.135 XinGangXiLu, Guangzhou 510275, China; liaoj37@mail2.sysu.edu.cn (J.L.) ; gaof66@mail2.sysu.edu.cn (F.G.) ; zhoucy@mail.sysu.edu.cn (C.Z.) ; liuzh8@mail.sysu.edu.cn (Z.L.)

^c Guangdong Engineering Research Centre for Major Infrastructure Safety, Guangzhou 510275, China

Correspondence: Correspondence: zhoucy@mail.sysu.edu.cn (C.Z.)

These authors contributed equally to this work.)

Abstract: As they relate to common structures in the delta region, the changes in coupling patterns among the foundation pit, slope, and embankment are an important research topic in the field of geotechnical engineering. However, most studies focused on their changes have concentrated on analyzing how they are related, and there is a lack of quantitative analysis of the sensitivities within the structures and the factors that affect the correlation of such changes. This makes it impossible to reveal the correlation mechanisms of proximity structure changes in depth, hindering the overall stability control of the structure system. To this end, we propose a smart analysis technique that can correlate modifications in various structures with various influential factors. As such, this method can regulate the overall stability of common structures found in the Delta region. We model the correlations between multiple constructs under multi-factorial conditions. Finally, we conduct a quantitative analysis of the impact sensitivities between structures and their factors. The above research methods were applied to a typical case study in South China, and present well (R^2 : 0.91–0.96, GCD: 0.848–0.976). The multi-influence factor multi-structure change correlation model developed in this study not only clarifies the intrinsic sensitivity factors affecting the change in correlation among structures, but also provides some implications for the design, construction, operation, and maintenance safety of typical structure systems in the delta region. It can also serve as a relevant reference for quantitative analyses of the impacts of proximate geotechnical structures and their sensitivities in other areas.

Keywords: Delta region; Proximate Structures; Changing Correlation; Sensitive impact factors