A new cone information transmission system

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ABSTRACT

A new small diameter cone sampler has been developed and its applicability for Pleistocene Osaka Ma12 clay, Ibaraki organic and clay deposits was examined (Shogaki and Sakamoto, 2004; Shogaki, et al. 2004).

In this paper, a cone information transmission system by wireless is outlined. The relationship between cone information and undrained shear strength of samples obtained from a cone sampler is examined and the applicability of the cone sampler for natural clay deposits is examined through unconfined compression (UCT) and index properties tests for samples obtained this way. The cone information transmission was not affected by rod length at a range of 34 m. There was no difference in cone information between a cone sampler having a wireless transmission system and one using a standard wire transmission. Concerning the cone sampler, the sampling cost is lower and soil sampling time is shorter, since an undisturbed soil sample can be taken without a borehole. The cone sampler can take higher quality samples and cone information.

KEY WORDS: Cone index; cone sampler; wireless transmission cone; pore water pressure; sample disturbance; sample quality; undrained shear strength.

INTRODUCTION

A new small diameter cone sampler has been developed and its applicability for Pleistocene Osaka Ma12 clay, Ibaraki organic and clay deposits was examined (Shogaki and Sakamoto, 2004; Shogaki, et al. 2004). The cone sampler can take high quality samples having low sample disturbance since the penetration speed and force of the cone sampler is higher than those of the 75-mm, 75D and 84T samplers identified in JGS 1221-1995, JGS 1222-1995 and JGS 1223-1995. The cone sampler can conduct cone penetration tests without a borehole. However, cone information, such as penetration resistance (q), pore water pressure (\(u\)), sleeve friction (\(f_s\)) and inclination (\(i_c\)) under cone penetration cannot be measured using a standard wire transmission from the cone sampler.

OUTLINE AND CHARACTERISTICS OF THE WIRELESS CONE INFORMATION TRANSMISSION SYSTEM

The longitudinal section of the cone sampler is shown in Fig. 1. The sampling tube positions for before and after tube penetration are shown in Figs. 1 (a) and (b). The cone penetration and sampling process after cone penetration are shown in Fig. 2. Figs. 2 (a) and (b) show the situation under cone penetration without drilling or a borehole. If undisturbed soil sampling is needed during the cone penetration test, the tube penetrates the ground by water pressure using the cone as a fixed piston, as shown in Figs. 2 (c) and (d). Fig. 2 (e) shows the situation after soil sampling. It was confirmed by Shogaki et al. (2004) that cone penetration did not adversely affect sample quality for clayey and organic soils.

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Fig. 1 Longitudinal section of the cone sampler