Equipment / Software:

CPTest version 3.xx / CPTask version 1.xx

Problem:

When I check the data in CPTask the last f_s samples seem to be missing. Furthermore, the f_s readings for the first samples are always zero.

Clarifications:

To understand why f_s readings are processed differently from q_c readings, it is necessary to take a look at the design of the cone and the GEF (Geotechnical Exchange Format) requirements.

Determination of the friction ratio requires obtaining the cone resistance and friction sleeve resistance at the same point in the soil mass. The cone tip is taken as the reference depth. The definition of friction ratio R_f (as per ASTM) is as follows:

> *The ratio of friction sleeve resistance f_s to cone resistance q_c measured at where the middle of the friction sleeve and cone tip are at the same depth.*

From the GEF standard we can read the following:

> *From GEF-CPT-Report 1,1,0 on, data in a scan refer to the values which are measured at the same penetration length as the cone resistance is observed.*

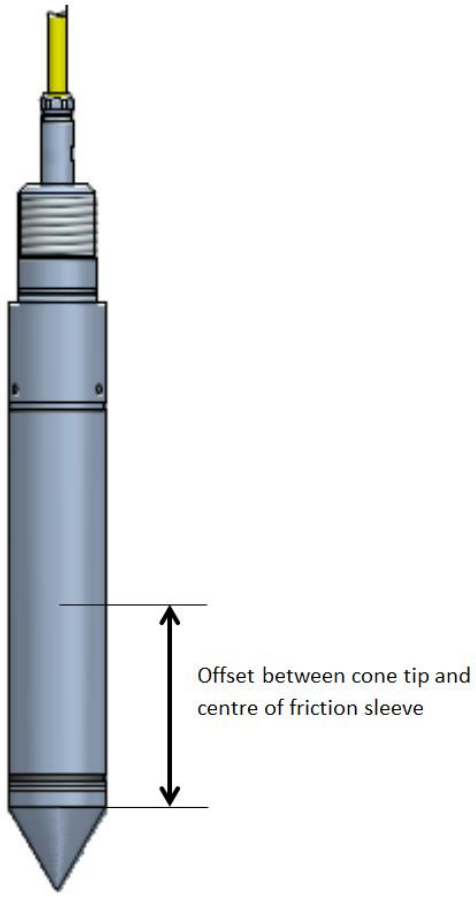
The design of the cone is such that the friction sleeve is located above the cone tip. The above shows that it is necessary to shift the f_s readings relative to the q_c readings. The centre of the friction sleeve is hereby considered as reference for the depth of the f_s measurement.

The distance between cone tip and centre of the friction sleeve, also referred to as offset, is stored in the GEF-file under measurement variable no. 5. This is typically 8 cm for 10 cm² cones and 10 cm for 15 cm² cones, but may be different for other cone types.

In CPTask and in the GEF-file, the f_s readings will therefore be shifted upwards compared to the q_c readings over the above illustrated 8 or 10 cm (or whatever offset is applicable for the cone used).

For the above reasons, it is obvious that the last f_s reading will always be at a lesser depth than the corresponding q_c reading. In other words, the centre of the friction sleeve will never reach the same depth as the cone tip will.

As a result, the last f_s readings (equal to the offset between cone tip and centre of the friction sleeve) in CPTask are blank.



Shifting f_s readings relative to q_c readings:

As measured:

Data

Depth in m	qc in MPa	fs in MPa
32.60	6.9913	0.11314
32.61	7.2619	0.13014
32.62	7.6148	0.14674
32.63	7.8736	0.15794
32.64	8.1206	0.16544
32.65	8.152	0.1743
32.66	8.2892	0.18756
32.67	8.4657	0.19711
32.68	8.4774	0.20089
32.69	8.3206	0.20323
32.70	8.0814	0.20311
32.71	7.5638	0.21056
32.72	7.1717	0.21012
32.73	6.6855	0.23152

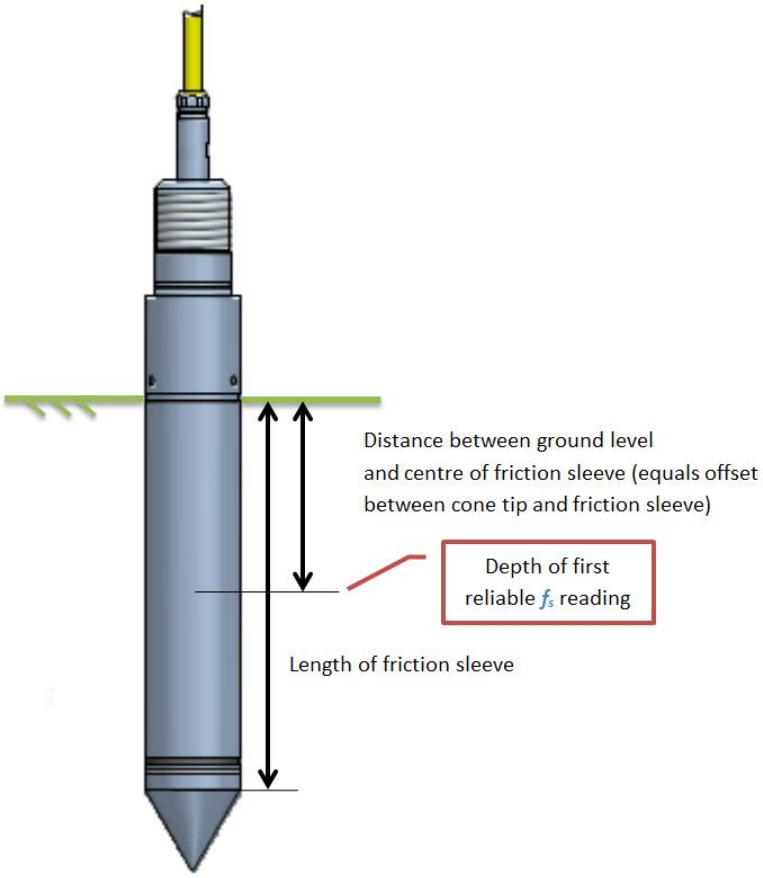
After processing (f_s readings shifted):

Data

Depth in m	qc in MPa	fs in MPa
32.60	6.9913	0.19711
32.61	7.2619	0.20089
32.62	7.6148	0.20323
32.63	7.8736	0.20311
32.64	8.1206	0.21056
32.65	8.152	0.21012
32.66	8.2892	0.23152
32.67	8.4657	
32.68	8.4774	
32.69	8.3206	
32.70	8.0814	
32.71	7.5638	
32.72	7.1717	
32.73	6.6855	

It also needs to be considered that reliable f_s readings are only to be expected once the full length of the friction sleeve has penetrated the soil mass. The first reliable f_s readings is therefore at a depth where the centre of the friction sleeve is at half the total length below ground level.

CPTest (in the GEF-file) and CPTask equal the non-reliable f_s readings above this point to zero.



Data

Depth in m	qc in MPa	fs in MPa
0.01	0.341	0
0.02	0.353	0
0.03	0.282	0
0.04	0.373	0
0.05	0.651	0
0.06	0.863	0
0.07	1.019	0
0.08	1.199	0
0.09	1.392	0.0006
0.10	1.584	0.0007