RESULTS

**Obtained Parameters**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Constrained modulus (at σ&lt;sub&gt;vo&lt;/sub&gt;)</td>
</tr>
<tr>
<td>Cu</td>
<td>Undrained shear strength</td>
</tr>
<tr>
<td>Id</td>
<td>Material Index</td>
</tr>
<tr>
<td>Vs</td>
<td>Shear wave velocity</td>
</tr>
<tr>
<td>Go</td>
<td>Low strain shear modulus</td>
</tr>
<tr>
<td>Ed</td>
<td>Dilatometer modulus</td>
</tr>
<tr>
<td>Kd</td>
<td>Horizontal Stress index</td>
</tr>
<tr>
<td>Gamma</td>
<td>Natural unit weight</td>
</tr>
<tr>
<td>Ko (clay)</td>
<td>Earth pressure coefficient at rest</td>
</tr>
<tr>
<td>OCR (clay)</td>
<td>Overconsolidation ratio</td>
</tr>
<tr>
<td>Phi (sand)</td>
<td>Friction angle (conservative)</td>
</tr>
</tbody>
</table>
FLAT DILATOMETER (DMT)

DMT determines in a quick, precise, simple and economical way various important parameters used in geotechnical design. The results are highly repeatable and independent from the operator. The blade is advanced in the soil by pushing the rods with penetrometers or drill rigs, or a variety of field machines. In this way boreholes and sample disturbance are avoided. The measurements are carried out directly on the in situ soil.

The results are immediately available in a report format, containing graphs and tabular outputs. The DMT is used in 50 countries. It is standardized in the ASTM (USA) norms and in the Eurocode. The equipment and test procedure are described in detail in the Report ISSMGE Committee TC16 (2001), downloadable from the website.

APPLICATIONS

- Settlements prediction
- Operative modulus M
- Undrained shear strength Cu
- Soil Type (sand, silt, clay)
- Compaction control
- Detection of slip surfaces in slopes
- P-y curves for laterally loaded piles
- Liquefaction potential
- Coefficient of consolidation and permeability (clays)
- $\phi$ in sands
- OCR and Ko in clays
- Subgrade reaction modulus for diaphragm walls
- Choice of Input parameters for Plaxis
- Subgrade reaction modulus for pavements

Settlement predictions


The superior accuracy of the DMT settlement prediction is due to the lower distortions caused by the blade penetration compared with the distortions caused by conical tips, to the fact that the modulus Mdmt is derived by a “miniload test” rather than by the penetrometric resistance at rupture, to the availability of the “Stress History Index” Kd, strongly related to OCR. Thanks to Kd, estimating the moduli, notoriously highly dependent from stress history, is univocal, avoiding arbitrary factors as in the case of penetrometric tests.

SEISMIC DILATOMETER (SDMT)

SDMT is the combination of the standard Flat Dilatometer (DMT) with a seismic module. Such module is a probe outfitted with two sensors, spaced 0.5 m, for measuring the shear wave velocity Vs. From Vs one can determine the small strain shear modulus Go.

APPLICATIONS of SDMT

The modern norms increasingly require seismic analysis, for which the basic parameter is Vs. SDMT provides profiles of Vs in a quick, precise, simple and economical way. Repeatability of Vs 1-2 %.

For complete seismic analysis it is necessary, besides Vs (or Go obtainable from Vs), the complete G-Gamma decay curve. At the moment SDMT is the only in situ test, besides the self boring pressuremeter, providing the low strain Go and the working strain M, hence two points in the G-Gamma curve. The availability of two points helps in the choice of the proper G-Gamma curve, unlike tests determining only Go.

SDMT provides, besides Vs, all the information obtained by the traditional DMT.

Liquefaction potential. SDMT provides at each depth two independent estimates of the liquefaction resistance, one derived from Vs, the other from Kd. Kd is sensitive to factors almost unfelt by other tests, in particular aging, a factor that may increase the liquefaction resistance even by 60% in loose sands (see Leon et al. Jnl ASCE GGE March 2006, evaluating the seismic risk under existing nuclear reactors in South Carolina).

Seismic codes. According to Eurocode 8 all new constructions should be preceded by an analysis of the local seismic response, requiring Vs from ground surface to 30 m depth.

Use of SDMT. Used worldwide, often in important projects, among others the Barriers for protecting Venice (Italy), Barcelona harbour and airport, the New Shuttle Crawlerway at Nasa Cape Kennedy, the San Andreas Fault area in California, Marina Pez Vela project in Quepos Costa Rica, big Power Plants, high speed Railways and Metro, various Harbours Nearshore, numerous research projects by Universities etc..

References

-Seismic Dilatometer. Additional information at website.