DYNAMIC AND STATIC BEHAVIOUR OF SAND SPECIMEN

by

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The Authors, under the assumption that low stress propagation waves are only entailing elastic phenomena, are of opinion that the correlation between bar and bulk are valid for dry sand specimen, as well as for their E, E^* modules and ν Poisson's ratio, provided the quasi static determination of both moduli are related to virtually elastic phenomena. The E modulus has therefore been obtained from the unloading phasesin a triaxial test , whereas E is obtained by a hedometric test after a great number of loading cycles, to ensure that no irreversible phenomena occur. The values reported in the following table refer to E^* and they have been dynamically derived from the bulk velocity under boundary conditions $\sigma_1 = \sigma_2 = \sigma_3$, this velocity being related to large band width pulse propagation. The values for R have been obtained from triaxial tests, as mentioned above, whereas the values for ν have been calculated subsequently. The test specimen were consisting of sand from Lake Massaciuccoli sized 0.5 thru 2 mm. The static and dynamic test findings for E were found to be in excellent agreement so that one single value is indicated hereinafter for E^* as a function of σ_1.

$\sigma_1 = \sigma_2 = \sigma_3$ kg/cm^2	E^* kg/cm^2	E kg/cm^2	ν
1	2400	1500	0,34
2	4000	2300	0,36
3	5400	2900	0,38
4	6550	3500	0,38

σ_1 (kg/cm^2)	0	1	2	3	4
E^* (kg/cm^2)	570	1430	1840	2110	2300

It should be noted that the number of load cycles is only affecting the quasi static determination thus confirming the hypothesis of elastic wave propagation. Furthermore it has also been found that radial stiffness of the container does not affect the bulk velocity values. It should be pointed out that dynamic measuring of the bulk velocity has not given rise to any difficulties at boundary over-pressure, whereas some difficulties were encountered in these conditions for measuring of the bar velocity.

For zero over-pressure at the boundary, the bulk velocity was found to be 187 m/sec and the bar velocity was 151 m/sec (when using narrow band width pulses and at low frequency), thus obtaining $\nu = 0.28$.

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