Abstract

Within the framework of the investigation of the embankment, especially in order to assess the performance of it compared to a process of flooding, means that one has to experiment with structures to real scale, therefore the techniques of construction of embankments has a prominent place. This is linked the process compaction and instrumentation of soil. To this point, an experimental embankment in Rouen (France) has been built, with the aim of studying the behaviour of the embankment.

Hence the origin (Rouen, France) of the two types of samples tested in this thesis; one remoulded and the other carved. These samples have different characteristics; one is manufactured by remoulding with different parameters and the second is obtained by carving soil from a sounding exercise of the same embankment, both from after the flood.

The importance of getting the shear modulus in small deformations (Column resonant); analysing and comparing the results with other equipment (triaxial) for graphics with the greatest range possible of displacement; and in parallel optimizing, modifying and experimenting with changes in this equipment is all very useful for obtaining further parameters and reaching satisfactory conclusions.

In this thesis, the study focuses on the change in volume experienced by a soil sample depending on the different levels of confinement. An experimental study on resonant column apparatus has been developed, which consists of submitting cylindrical torsion oscillations to a test, with the specimen fixed at the lower end and free at the upper end so that these oscillations are translated into an imposed cyclical shear.

The main usefulness of the resonant column for which it was designed is to determine the dynamic properties of soil such as shear modulus and damping. The equipment also has a vertical displacement transducer (LVDT), which allows it, in recorded information, to obtain axial displacements of the specimen at the end of every confinement.
On the other hand, for measuring volume changes in the specimen, a pressure differential transducer (DPT) has been installed with which different pressures between two columns of water are measured; one of these is constant and the other varies depending on the deformation axial and radial when it is subjected to a stress of confinement. In this case a consolidation takes place that changes the level of the water column within which the specimen is submerged, therefore this pressure differential is detected by the (DPT) that was previously calibrated with the geometry of the cell of pressure.

After obtaining data (DPT) it is possible to achieve the calculation of the volumetric deformation based on the geometry of the specimen, the volume of the recipient that contains the specimen and subsequently the density at the end of each consolidation. Furthermore the intermediate densities can be obtained, which can relate to the shear modulus obtained in that same instance, both for samples remoulded and for samples undisturbed.