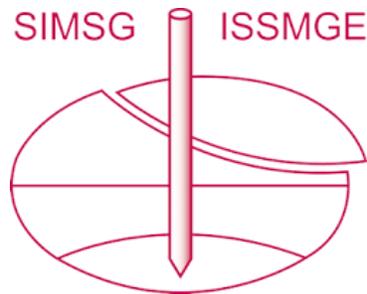


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Predicting the mechanical behaviour of structured soils

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Many naturally occurring sedimentary soils and most residual soil deposits are known to possess some form of structure, which enables them to behave differently from the same material in a reconstituted state whenever subjected to mechanical loading. An important feature of the mechanical behaviour of structured soils is the occurrence of a destructuring phase associated with loading, during which the initial soil structure may be partially or completely lost. In extreme cases, the mechanical response of such soils may change from rock-like to soil-like behaviour. In particular, at some point during the loading of many of these soils a small change in the stress-state may cause very large strains. Therefore, significant inaccuracies in predictions can arise if the influence of soil structure is not considered. Indeed, under some circumstances the initial structural features of the soil may in fact dominate the subsequent engineering behaviour.

The key to obtaining accurate predictions of the mechanical response of such soils is the development and application of reliable stress-strain (or constitutive) models for these materials, and the incorporation of these models in numerical procedures used to solve the appropriate boundary value problems.

In this lecture, key elements of the behaviour of structured soils will be reviewed briefly and a class of constitutive models suitable to describe the complex behaviour of such materials will be described. Application of these models to the prediction of the bearing response of structured soils will also be described, allowing quantification of the influence of initial soil structure on the response of footings. Identification of the key engineering properties having the most influence on this response will be conducted, and ways in which such parameters may be measured in practice will be discussed.