

Lithological inhomogeneity, bonding weakness and fissuring intensity, the main factors which govern the hydro-mechanical behavior of Italian tectonized fine-grained deposits

L. Picarelli

The two well known mountainous chains in Italy, the Alps, on the Northern boundary, and the Apennines, the backbone of the peninsula, include large deposits of highly tectonized clay shales whose special structural features strongly affect hydraulic and mechanical properties. It is worth to mention that similar materials can be found on the entire Mediterranean basin.

The geotechnical characterization of these formations is a very complicated task which cannot entirely bear on the classical approaches of the Soil Mechanics. In fact, the role of the stress history is much more complex than for the “scholastic” soils described in textbooks, whose structure is essentially associated with the void ratio, the only basic property accounted for in soil models.

The structure of the macro-element of tectonized clay shales is a combination of three basic factors which are the result of a severe epigenetic stress history: i) inhomogeneity, due to the coexistence of the fine-grained material and rock blocks or fragments, ii) weak and degradable bonding, due to ageing and mostly, to tectonism, and iii) fissuring due to tectonism and in some cases, to post-emplacement slope deformations. As a result, the void ratio has a minor role. In fact, in spite of the low void ratio (and of bonding and rocky component) both operative strength and stiffness are quite low.

Even though these formations are widespread on the entire country, their hydraulic and mechanical behaviour is still investigated and modelled having in mind classical unsuitable approaches.

Tunnelling, cutting and the exploitation of natural slopes are every day major problems for engineers. In fact, the construction of highway and railway tunnels has always encountered insurmountable obstacles in the poor mechanical response of these formations. Moreover, every day landslides take place in crucial areas interacting with infrastructure and settlements.

After a general overview about the hydraulic and mechanical behaviour of tectonized clay shales, the paper discusses typical problems posed by natural slopes. In particular, some data regarding recent slope stability experiences are briefly reported.

Since similar problems are shared by other communities on the Mediterranean basin, a network of information, a sharing of experience and a common approach are strongly needed in this part of the world. Our hope is that such a workshop will contribute on this way.