

A reliable numerical model for searching universal curves of average degree of consolidation in heterogeneous soils

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ABSTRACT

The construction of universal curves of average degree of consolidation is the main aim for the design of scenarios formed by saturated clays under loads applied at the soil surface. This requires a large number of simulations since these problems are ruled by two or more dimensionless groups in multi-layered soils. For example, in a two-layered soil, the independent dimensionless groups are: the consolidation coefficient and thickness ratios of the layers, in addition with time factor. In this communication, a reliable numerical model based on electrical analogy is designed and simulated with the free software Ngspice. Only basic rules of circuits' theory are required for the design of the model which starts from the finite-difference differential equation that comes from the diffusion partial differential governing equation. Both drainage and impermeable boundaries, as well as the connection between layers, are carried out by simple electrical devices defined in the libraries of these computational codes. For a wide range of values of the former ratios (one order of magnitude above and below unity), the average degree of consolidation is universally shown by a set of abacus as a function of the time factor.

REFERENCES

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