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# A NUMERICAL STUDY FOR THE SIMPLIFICATION OF LARGE SCENARIOS OF SEEPAGE UNDER DAMS

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The seepage flow under concrete dams, besides its dependence on soil permeability and the different total head upstream and downstream, is strongly determined by the geometry of the scenario.

However, there are limits in the length and depth of the ground for which the quantity of seepage converges to a maximum value. This means that there are limits values for these quantities, which are not independent, that separate two type of scenarios: those that determine an infiltration flow that depends on the geometrical parameters (finite scenarios), and those that determine a discharge flow independent of this parameters (infinite scenarios). In order to reduce the computing times required for the simulation, the last scenarios could be shortened accordingly to their limit values. In this work, the curve that separates the finite and infinite scenarios is determined as a function of the dimensionless groups 'a/e' and '(kx/e2)(d2/Ky), coming from dimensional analysis, that characterize the anisotropic medium problem. The points of this curve have been chosen for a quantity of seepage that is a percentage of its convergence value. In these number, a is the upstream and downstream length, e is the base length of the dam, d is the depth of the ground and Kx and Ky are the horizontal and vertical permeability of the soil. This allow the user, for a given data, to set these groups, to check if the scenario under study is finite or infinite, and hence to reduce it in the second case to the limit values of the domain. That allows us to optimize the computing time.

The numerical solution for the determination of the points of the searched curve is based on network method, a reliable and accurate tool that has been successfully used in lots of linear and non-linear engineering problems like heat transfer, corrosion or vibrations. In particular, we consider two applications to illustrate the subject of this work.