Some notes on parameter identification

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Analytic suggestions for non-linear inverse problem solution

The non-linear minimization generally entails excessive numerical work since the objective function has a great number of critical points due to the noise. At present, because of this, the evaluation of most of the geotechnical tests is approximate and, the reliability of the so determined solution is not tested.

A method is suggested here to decrease the parameter number in the non-linear minimization algorithm of a convex Least Squares merit function F(p)=F(x,y) which can be used for reliability testing as well. The minimisation is made in two steps. The first is a sub-minimisation for each fixed value of x to determine y=g(x) where g(x) is an implicit function. F[x,g(x)] a „deepest" section of the LS merit function called clever section, which is minimised in the second step with respect to x and can be used for parameter error estimation.

This split has some significance in case of noisy problems of nice models where the linearly dependent parameters can be eliminated and the clever section of the noisy merit function is nearly convex.

The first example presented in the paper illustrates how the linearly dependent parameters can be eliminated in the secant algorithm. The second example presented in the paper is the global minimization method applied for the evaluation of the two staged oedometric tests, the standard oedometric compression tests and the short multistaged oedometer test where the noise-free inverse problem may entail convex merit functions.