Jodi Mead

The chi-squared method for constrained parameter estimation, and calculation of data weights.

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The chi-squared method is a parameter estimation method for ill-posed problems. We form it as a weighted least squares problem, where the weights are found by ensuring the parameter estimates satisfy the chi-squared test. Data and parameters are assumed to be random, but not necessarily normally distributed. The method was introduced by Mead (2007) and made efficient by Mead and Renaut (submitted). It is considerably more efficient, and as accurate as traditional L-curve and cross-correlation methods for parameter estimation. In this work we develop the chi-squared method for parameters with constraints, and use it to find data weights. Results from Hydrology will be shown, and include soil moisture parameter estimates. The data error is calculated by the chi-squared method, and parameter estimates are found within a priori data uncertainty ranges.