MMA - Multi-Model Analysis Program

MODFLOW AND MORE 2017 Demo

Judith Schenk and Eileen Poeter
jschenk@alumni.mines.edu

Link to download MMA: http://igwmc.mines.edu/freeware/mma/
Link to MMA demo files: http://igwmc.mines.edu/freeware/mma/MMA_Demo_MFandMore2017.zip

The MMA computer program performs multi-model analysis and provides statistical information for any quantitative model that produces text output.

Steps for multi-model analysis using UCODE_2014 and MMA:

1. Create different conceptual models of a groundwater system.
2. Calibrate a set of models of the groundwater system using the same observation data set (UCODE_2014 in optimization mode).
3. Check for model deficiency and remove deficient models from model set.
4. Generate predictions (UCODE_2014 in prediction mode).
5. Generate prediction statistic file (UCODE_2014 auxiliary program Linear_Uncertainty).
6. Direct MMA to model directories that include MMA files (MMA input file).
7. Run MMA and evaluate results.

Information Criteria (IC) equations are used to evaluate the strength of evidence of each model in the model set. These equations have the general form:

$$IC_{score} = Goodness\,of\ \ fit + Penalties$$

Models with the lowest IC score is assigned the highest IC probability. IC equations presented in the MMA example include; Akaike (AIC), Akaike corrected (AICc), Bayesian (BIC), and Kashyap (KIC).

Generated UCODE_2014 and Linear_Uncertainty files required to run MMA

OR MMA required text files may be created externally if UCODE_2014 is not used

*filename.*_dm information for non-linear regression analysis

*filename.*_linp predictions and variance on the prediction

*filename.*_os simulated equivalents of the observations produced by the

*filename.*_pc calibrated parameter information

*filename.*_r raw residuals (simulated equivalent-observed value)

*filename.*_ss sum of squares weighted residual for each parameter estimation iteration

*filename.*_w weighted residuals

*filename.*_ws simulated equivalents and weighted residuals