Calibration of hydrological model with programme PEST

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PEST is tool based on minimization of an objective function related to the root mean square error between the model output and the measurement.

We use "singular value decomposition", section of the PEST control file, and Tikhonov regularization method for successfully estimation of model parameters. The PEST sometimes failed if inverse problems were ill-posed, but (SVD) ensures that PEST maintains numerical stability.

The choice of the initial guess for the initial parameter values is an important issue in the PEST and need expert knowledge.

The flexible nature of the PEST software and its ability to be applied to whole catchments at once give results of calibration performed extremely well across high number of sub catchments. Use of parallel computing version of PEST called BeoPEST was successfully useful to speed up calibration process. BeoPEST employs smart slaves and point-to-point communications to transfer data between the master and slaves computers.

The HBV-light model is a simple multi-tank-type model for simulating precipitation-runoff. It is conceptual balance model of catchment hydrology which simulates discharge using rainfall, temperature and estimates of potential evaporation. Version of HBV-light-CLI allows the user to run HBV-light from the command line. Input and results files are in XML form. This allows to easily connecting it with other applications such as pre and post-processing utilities and PEST itself.

The procedure was applied on hydrological model of Savinja catchment (1852 km2) and consists of twenty one sub-catchments. Data are temporary processed on hourly basis.