THE PARAMETER ESTIMATION OF ARMA MODEL FOR A RIVER DEBIT FORECASTING USING GOAL PROGRAMMING

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Abstract

River debit forecasting is one step to anticipate the instability of a river flow. One method that can be used in river debit forecasting is time series method. ARMA model (autoregressive moving average) is one of the time series model. In forecasting process, after identifying the model parameter estimation was done. To estimate the parameters of ARMA model used conditional least square approach and further optimized using goal programming. ARMA model to a monthly average debit of the Brantas river for Kediri observation station is:

\[
Z''_t = \mu + \phi_1 Z''_{t-1} + \phi_2 Z''_{t-2} + a_t - \theta_1 a_{t-1} - \theta_1 \theta_1 a_{t-12} - \theta_1 \theta_1 a_{t-13}
\]

\[
Z''_t = \mu + AR1Z''_{t-1} + AR2Z''_{t-2} + a_t - MA1 a_{t-1} - SMA1 a_{t-12} - MA1SMA1 a_{t-13}
\]

with:

\[
AR1 = 0.791156, \quad AR2 = 0.000, \quad MA1 = 0.000, \quad SMA1 = 0.000, \quad Cm = 0.450847, \quad Z''_t = \sqrt{\ln Z_t}
\]

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