PREDICTION OF THE LENGTH OF DAY FROM ATMOSPHERIC ANGULAR MOMENTUM WITH LSTAR MODEL

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Adopting the time series of atmospheric angular momentum (AAM) from the National Meteorological Center of USA, the study of the prediction of the length of day (LOD) has been made by the Leap-Step Threshold AutoRegressive (LSTAR) model. The LSTAR model presented by the author is a sort of models for nonlinear time series analysis such as

$$Z_n = TSM^{(j)} + E_n^{(j)} \qquad Z_n \epsilon D_j \quad j=1,2,\cdots,L$$

where D_j is the j-th leap-step domain of the data series Z_n, and if the sample number N=LxM, then $Z_{j+(LxK)} \epsilon D_j$ and K=0,1,...,M-1. $E_n^{(j)}$ denotes the white noise of data in the j-th leap-step domain. TSM denotes a class of models in time series analysis and the nonlinear threshold autoregressive model is used here.

The predicted values for 1990 through 1991 were calculated by LSTAR model from AAM data during 1976 to 1989. The dispersions of the predicted values from the real ones of AAM and LOD are listed in the Table. Its bottom row gives the dispersion of the differences between LOD of IERS and AAM from 1976 to 1991 of which the fluctuations in LOD with the periods of longer than 10 years were eliminated by the Multi-Stage Filter. It is shown from the Table that the prediction of LOD from AAM data with LSTAR model has not only higher accuracy but also of better stability for longer periods.

Comparison	Dispersion
predicted AAM - real AAM	±0.185 ms
predicted AAM - real LOD	±0.227 ms
LOD - AAM	±0.272 ms

I.I. Mueller and B. Kołaczek (eds.),
Developments in Astrometry and Their Impact on Astrophysics and Geodynamics, 335.