

Autoregressive Modeling of LOD and UT1

K S Hamdan and L-Y Sung (Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91 109-8099; tel: 818-354-3940)

In this talk, a general stochastic model for UT1 and LOD will be proposed, and the corresponding Kalman filter model will be derived. This stochastic model consists of an arbitrary sum of general autoregressive moving average (ARMA) processes, each characterizing a different frequency band. This general formulation of the Kalman filter allows for experimentation and variability in choosing different stochastic models for UT1, which in turn depends on the frequency band one wishes to model accurately. The general formulation can also be applied to various time series, including polar motion and AAM.

Based on the general formulation, several models for UT1 were derived from spectral analysis of the SPACE92 UT1 series (Gross, 1993). Using SPACE92 as the reference series, the candidate models were compared based on their ability to predict UT1 and LOD up to 30 days in the absence of data. These candidate models were compared with the JPL operational Kalman Earth Orientation Filter (KEOF) which assumes a random walk model for LOD (Morabito *et al.*, 1987). The results of the comparison revealed that adding an AR1 model to the random walk reduces the LOD prediction error by 10% to 20% during the first 30 days of prediction. A further reduction of the error can be achieved by autoregressive modeling of the 30-50 day oscillation in the LOD, in addition to the above random walk and AR1.

1. 1994 AGU Spring Meeting
2. 001310361
Sponsor: J. O. Dickey
- 3a. Kamal Hamdan
MS 238-332
JPL/Caltech
4800 Oak Grove Drive
Pasadena, CA 91109
- 3b. 818-354-3940 (Office)
- 3c. 818-393-6890 (FAX)
4. G (Geodesy)
- 5a. GJO High Time Resolution
Measurements of Earth
Orientation: Progress
and Prospects
- 5b. 1239 Rotational Variations
1229 Reference Systems
1299 General or miscellaneous
6. 0 (Oral)
7. 0% at Fall AGU Meeting
8. Charge \$40 to Kamal Hamdan
MasterCard 5414 82001902
8976
Expires 3/95
9. C
10. N/A
11. Yes