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ADDITION OF RANDOM RUN FM NOISE TO THE KPW TIME SCALE ALGORITHM

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KPW (Kalman plus weights) is a time scale algorithm in which the Jones-Tryon Kalman filter [1] provides frequency estimates to the basic time scale equation. At this writing, KPW uses a two-state (phase, frequency) random walk clock model with known noise levels. The data consist of noiseless clock-difference measurements at a sequence of dates. The Kalman filter is initialized and allowed to run autonomously from the measurement data. Its phase estimates are discarded; at each measurement date, however, the frequency estimates are used in a conventional basic time scale equation, whose clock weights are inversely proportional to the white FM noise levels.

This time scale has been verified by simulations to be about as stable as other time scales that make heavy use of Kalman filtering [2]. The present paper will report on the success or failure of the scale when three-state clocks (phase, frequency, drift) are used in the Kalman filter. White PM and measurement noise will also be tried if time permits.

[1] R. H. Jones and P. V. Tryon, "Continuous time series models for unequally spaced data applied to modeling atomic clocks,", SIAM J. Sci. Stat. Comput., vol. 8, no. 1, pp. 71-81, Jan. 1987.

[2] C. A. Greenhall, "Kalman plus weights: a time scale algorithm," 33rd Ann. PTTI Meeting, Long Beach, CA, Nov. 2001.

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