

## KALMAN PLUS WEIGHTS: A TIME SCALE ALGORITHM

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The purpose of a time scale is to create a virtual clock from a set of real clocks whose differences from each other are measured periodically. One wishes the virtual clock to be quieter than any of the real clocks in both the short term and the long term. Since the early 1980s, time scale algorithms have been formed by running Kalman filters on the clock difference measurements, the noise of each clock having previously been modeled as a sum of white and random walk processes.

The natural time scale that comes out of the so-called Kalman time filter turns out to be noisy in the short term. To supplement this filter, the method described here uses the traditional basic time scale equation, which requires frequency estimates and a set of weights. The frequency estimates come from the Kalman filter, whose time estimates are ignored. The weights are inversely proportional to the spectral densities of the white FM components of the clocks.

I shall show results from simulations of clocks with independent white FM and random walk FM components. Included is a set of eleven cesium clocks that were characterized in the 1980s at NIST.

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