

NIST Technical Note XXXX

Aligning Timescales and Frequency Combs

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Abstract

Required

Key words

Required, alphabetized, separated by semicolon, and end in a period.

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Glossary

Delete if not applicable

1. Introduction

- Initial input: Independent series of clock and comb data
 - Clock shift files containing variables: MJD, shift, and possibly ISGOOD
 - Frequency comb data containing variables: MJD, SDR:frep ErYb, fo ErYb, fb Si ErYb, fb Al ErYb, fb Yb ErYb
- Read data into Python
- Define functions to find optical frequencies for each clock with comb equation, these frequencies will become additional variables in the frequency comb data object
- compute total correction for each clock's shift data
- Data processing
 - change all data variables to type float for high precision computing
 - find overlapping MJD values for each clock frequency data set
 - visualize gaps in the clock frequency data sets
 - decide upon initial and final MJD values for analysis
- Imputation - decide how to deal with missing shift values
 - adjust start/end MJD indices for large gaps of missing values
 - use interpolation techniques (see below) for short sequence of individual missing values
 - keep with caution about how this may impact subsequent steps
- Interpolation - to get clock data to match up with comb time intervals, key difference from imputation step is data is contained w/in a certain range of start/stop MJD values
 - `numpy.interp`, linear
 - `pandas.interpolate`, linear
 - incorporate randomness
 - kalman smoothing
- Calculate clock frequencies by adding together comb frequencies and shift data, scaled by the total correction amount
- End results: clock ratio data to compute offset to compare to previous measurements (may contain missing values?)

The chrysanthemum can be seen in Fig. ?? . You can learn more about flowers in Refs. [? ? ? ? ? ? ? ? ? ? ? ? ? ?] .

1.1 All Subsection Headings Capitalized

This can be seen in Eq. (1) and Table 1. Information about flowers is available in Sec. ??.¹

$$x^n + y^n = z^n$$

(1)

Table 1. Title.

ColumnA	ColumnB
text	text ^a
text	text
text	text
text	text

^aFootnote

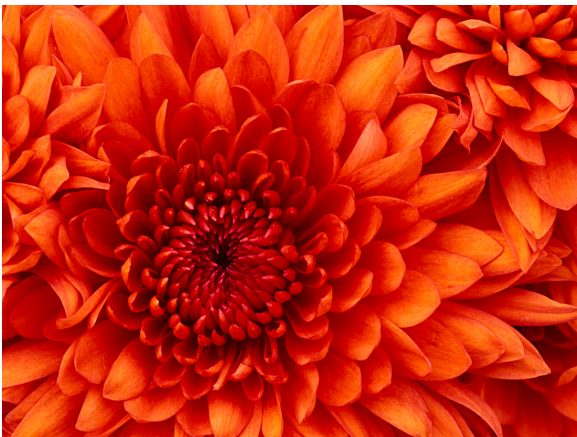


Fig. 1. This is the caption text.

References

¹NIST disclaimer text here.