

EHLERS 2022 WORKSHOP SYLLABUS

The Robustness Workshop

The workshop consists of 16 one hour modules plus a 4 hour question and answer period. Four modules per day will be presented via Webex the week of October 10, starting shortly after the market close.

MODULE DESCRIPTIONS

1. Introduction and Overview.

The basic requirements of successful trading strategies right at the outset of the workshop will be established and I will give the workshop roadmap to describe how we will meet those requirements in making robust strategies. My scientific approach is compared to some aspects of conventional technical analysis. I will also review my experience so participants will be confident that I am an authority on the subject matter.

2. Cycle theory and math basics

The physical origins of cycles are discussed. The mathematical tools necessary to handle market indicators and strategies include components of algebra, trigonometry, calculus and complex variables. The concept of Z transforms to deal with filters and strategies are introduced. Advanced math is not a prerequisite.

3. Technical description of market data

Market data are fractal. That has broad implications regarding the spectral content, and hence, basic requirements on filter structures. Further, market data is sampled data, and therefore is subject to aliasing. Basic data structure enables the estimate of a data time constant, which has a huge impact on the requirements for Walk Forward Optimization.

4. Finite Impulse Response Filters

Simple Moving Averages are part of the class of FIR filters. Basic understanding is clarified through the use of Z Transforms. Near optimum, easy to program windowing functions are developed, including Triangle, Hamming, and Hann windows. The extreme importance of filter phase response will be underscored.

5. Infinite Impulse Response Filters

IIR Filters are described with reference to the Transfer Function. Several filters are developed, including my SuperSmoother, enhanced EMA, and High Pass filters. How to perform IIR truncation is a topic that arose from the development of Walk Forward Optimizers. Both Group and Phase delays will be described.

6. Smoothing Filters

Special smoothing filters like my SuperSmoother, Decycler, and Filt11 zero lag filter are developed. Gaussian and Chebyshev filters are described, with code. A host of adaptive techniques are explained and coded.

7. Bandpass and Passband Filters

Narrow Band and wide band BandPass filters are described, including my Roofing Filter and my new Elegant Oscillator. Associated topics include Automatic Gain Control (AGC) and Standard Deviation Normalization.

8. Indicators and Transforms

The RSI and Stochastic standard indicators are improved from DSP perspective. My Reflex, Anticipate, and "Even Better Sinewave" indicators are described. A Hilbert Transform that produces real and imaginary components for market data is described. The Fisher Transform that converts market data to have a Gaussian Probability Distribution is described.

9. Spectrum Estimators

There are three primary methods to measure market data spectra. These are MESA (Maximum Entropy Spectral Analysis), DFT (Direct Fourier Transform), and a comb filter bank of Bandpass filters. These methods are developed and compared. A new method of computing the dominant cycle using the Hilbert transform is disclosed, with applications of tuned indicators.

10. Swami Charts and Ehlers Loops

The purpose of the SwamiCharts heatmaps is to provide an overview of market activity. It turns out to be useful to disclose the strengths and weaknesses of various technical indicators. You will have templates to build your own SwamiCharts. SwamiCharts is the basic technology in Think Or Swim's "Thermo Mode". Ehlers Loops are a tool for discretionary trading. They can be used to form predictions based on the interactions of price and volume. They can also be used for Pairs Rotational Trading, a technique designed to minimize drawdown.

11. Correlation as a technical indicator

Pearson, Spearman, and Kendall Correlations are developed as technical indicators. Correlation can provide real and imaginary components, leading to robust phase angle indicators and trading strategies.

12. Predictions

Technical prediction establishes the current conditions and extrapolates them into the future. Several advanced techniques, including the MESA and Voss predictors, are described to implement effective predictions

13. Trading Strategy Overview

The purpose of the trading strategy overview is to establish expectations for the performance of algorithmic trading. Discussions include probability of failure, statistics for profit and drawdown, mathematical expectation, Optimal F, Bertrand's Ballot Theorem, Stein's Paradox, and the underlying principles of trading system parameter optimization. Parameter interactions are compared to Moiré' patterns.

14. Basics of Robustness

Requirements for robust cyclic trading strategies are described. These requirements are based on the structure of market data itself. A new tool to evaluate indicators for robustness is disclosed. This tool characterizes indicator performance using deterministic waveforms rather than a hunt-and-peck approach using noisy market data. This is one of the WOW! factors derived from an engineering approach to the technical analysis.

15. Robust Strategies

Seven different new robust trading strategies are disclosed, in both intraday and daily data formats. Nonlinear filtering in terms of surrogate waveforms are described.

16. Optimization and WFO

Walk Forward Optimizers (WFO) enable a trader to evaluate trading strategy performance on out-of-sample data rather than misleading insample performance. The problem is that platform WFOs simply don't work. My WFOs are blazingly fast, and can be used as regular trading strategies by themselves. The WFO structure can be used as a template to develop new WFO trading strategies.

Notes:

- 1) All code is given in EasyLanguage.
- 2) All advanced indicators and trading strategies are fully disclosed, including the MESA algorithm.
- 3) While the technical techniques are universal, applications and examples will be presented primarily using Index Futures.