

Thesis Plan

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In this plan, we include the structure of the final thesis in detail and estimated in page numbers in the brackets.

In the previous 2.5 years course, we published a paper in Astronomy & Astrophysics (Yuan et al. *Leakage of long-period oscillations from the chromosphere to the corona*, A&A, 553(2011) 116). Another paper (Yuan & Nakariakov, *The measurement of the apparent phase speed of propagating EUV disturbances*, A&A) is submitted, we are currently revising it to comply with the referee report. The current project still needs 3-4 month to complete, and we expect to summarize two papers in May and July, respectively. Before Christmas 2012, we plan to have a draft dissertation ready. We hope to submit the thesis before Feb 2013.

In the thesis, we will include the general background, theoretical work in solar coronal waves, present the methods that are used, and summarize our result in separate sections as detailed in the following:

Compressive waves in the solar atmosphere (100-137 ps)

1. Introduction (36-58 ps)

- 1.1 Solar observation (11-18)
 - 1.1.1 Solar structure (1-2 ps) (literature review)
 - 1.1.2 Solar activities (1-2 ps) (literature review)
 - 1.1.3 Solar corona (1-2 ps) (literature review)
 - 1.1.4 sunspot & active region (2 -3 ps) (literature review)
 - 1.1.5 Instruments (5-7 ps) (literature review)
- 1.2 MHD waves and Oscillations (11-14 ps)
 - 1.2.1 MHD theory (2-3ps) (literature review)
 - 1.2.2 MHD waves (7-8ps) (literature review)
 - 1.2.3 QPP in solar flares (2-3 ps) (literature review)
- 1.3 Time Series Analysis (14-20)
 - 1.3.1 FFT (1-2 ps) (literature review)
 - 1.3.2 Periodogram (3-4 ps) (literature review)
 - 1.3.3 Wavelet (3-4 ps) (literature review)
 - 1.3.4 Window FFT (1-2 ps) (literature review)
 - 1.3.5 DCFT (2-3 ps) (literature review)
 - 1.3.6 Significance test (4-5 ps) (literature review)

2. Image artifact effects (10-15 ps)

- 2.1 Orbital effects (3-5 ps) (completed)
- 2.2 AIA De-rotation artifact (7-10 ps) (completed)

3. Characteristics of propagating disturbances (31-50 ps)

- 3.1 Introduction (4-5 ps) (literature review)
- 3.2 Phase speed measurement (20-30 ps) (completed)
- 3.3 Temperature-dependency (4-5 ps) (methods developed, more analysis is required, 2-3 weeks needed)
- 3.4 Wave front morphology (5-10 ps) (undergoing, 2-3 weeks needed)

4. The leakage of long-period oscillations (10-14 ps)

- 4.1 Amplitude modulation (5-7 ps) (completed)
- 4.2 Long-period oscillation (5-7 ps) (completed)

5. Properties of sunspot waves (15-22 ps)

Power map analysis (5-7 ps) (Data are ready, interpretation is undergoing, 2-3 weeks needed)

- 5.8 Cut-off frequency distribution (10-15 ps) (results are ready, 2-3 weeks needed to refine the results)

6. Conclusion and discussions (5-10 ps) (summary)