

Waves in Solar and Stellar Coronae

Progress Report and Research Plan

(Year 2)

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1 Progress Report on Year 1

During the first half of year 1, I mainly focused on the modules listed in the project outline, I successfully passed the courses and get the credits, except two of them, which I will have to coordinate time to take the exams. I read the introductory materials and gained the skills in Fourier Transform based techniques (FFT, periodogram etc.) and time series analysis (windowed FFT, wavelet etc.). A number of handy procedures in IDL were coded and implemented in the project, and are ready for adaption for future use.

In the second half year, I started analysing a long-term TRACE EUV imaging observation in both 171 Å and 195 Å bandpasses. The whole observation on active region AR8253 last from 30 June to 4 July 1998, we took the advantage of the long time span and focused on long-period oscillations. we found the co-existence of a series of harmonic periods, 12, 24, 32, 48, 96 mins everywhere in the EUV images, since the orbital period of TRACE in the sun-synchronous orbit is 96 mins, we concluded this is generated from the 96 mins orbital period due to the complexity of the instrument system and orbital inhomogeneity.

2 Current Work

I am currently writing specified chapter of PhD dissertation on instrumental effects based on the conclusions of the first project, discussing the source of instrumental effect, physics, and its impacts on observation. we will correct the misunderstanding on long-period oscillation close to the harmonics of the

orbital period. In parallel, I will summarize a refereed paper on instrumental effect, which were not investigated systematically by other researchers.

Since the release of SDO/AIA data, I attempted to gain experience in analysis of SDO, by reading documents and practical work. this will facilitate future work

3 Future Plan

1. Learn how to select, order and download data of SDO/AIA instrument from the instrumental team server at Lockheed-Martin, USA; Gain knowledge in relevant data pre-processing techniques
2. Identify candidate regions-of-interest and times for the analysis of upward propagating slow magnetoacoustic waves in the corona; Download and pre-process data and analyse the time variability of the envelope of 3 and 5-min waves, compare their properties in different observational channels, and for various latitude and longitude positions on the solar disk
3. Get familiar with pre-processing and processing of data of the Nobeyama Radioheliograph. Analyse the microwave emission of the objects studied in 3.2 and perform the comprehensive analysis. Items in 3.2 and 3.3 are expected to result in research papers
4. Work with Dr. W. Chaplin to investigate the possibility of detecting oscillations in stellar spots