

with a position of a bright spot shown in the FOC image of Jupiter's northern aurora by Caldwell et al. (1992). Among the 18 auroral areas, there seems to be an anti-correlation between the rotational temperatures and the total emission rates, implying that characteristic energy of precipitating electrons increases with precipitating energy flux.

태양 정은 홍염의

H α 선과 Ca II H&K선 관측 연구

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1992년 8월 16일에 발생한 울타리형 정은 홍염에 대하여 Norikura Corona 관측소의 25 cm 코로나 그래프를 이용하여 CCD 분광 관측을 수행하였다. 관측한 분광선은 H α 선과 Ca II H, K 선이며 각 분광선의 분광 분해능은 각각 0.025 Å/pixel, 0.023 Å/pixel, 0.023 Å/pixel 이었다. 홍염 내부의 광학적 깊이가 알고 LTE임을 가정하고 온도, 전자밀도, 비열적 속도 성분 등 항성 대기의 기본 물리량의 수평, 수직 분포를 살펴보았다. 홍염 내부의 평균 물리량은 $T = 8000$ K, $n_e = 10^{10.38}$ /cm 그리고 V_t km/s 로서 Hirayama(1989) 가 발표한 정은 홍염의 평균 물리량과 잘 일치하고 있으나 홍염 내부에서 보여주는 물리량들의 변화 폭은 기대 이상으로 높게 나타나고 있음을 볼 수 있다.

Dynamical Characteristics of Umbral Chromospheres

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Dynamical behaviors of umbral chromospheres are studied by analyzing the spectral fluctuations of Ca II H and K lines of a sunspot umbra. These spectra were taken simultaneously with a time interval of 30 sec. for 20 min. by Echelle spectrograph of Sacramento Peak Solar Observatory, during which time the slit was kept fixed. The individual photographic spectrogram have been scanned by PDS of Korea Astronomy Observatory to convert the photographic density to the relative intensity.

In order to investigate the dynamical characteristics of the umbral chromospheres we set up time sequences of a few important physical quantities subject to dynamics, such as peak intensities of H and K line cores, their Doppler shifts and turbulent velocities valuated at 35 locations across the spot. With these quantities we made correlation studies and Fourier analyses. The main results are the following:

- (1) 3 min. oscillatory behaviors of umbral chromospheres have been confirmed at all of the selected 35 locations of the sunspot umbra. Both of the power spectra made out of Doppler shifts of Ca II H and K line cores and their peak intensity fluctuations reveal a distinct dominant peak at about 5.5 mHz.
- (2) The Doppler shifts of H and K lines are highly correlated with their peak intensity fluctuations. The peak-to-peak Doppler shift often reaches as large as 6 km/sec, which is indicative of nonlinear behavior of the oscillations.
- (3) The turbulent broadenings of the H and K line cores are tightly correlated with their peak

intensity fluctuations. It is found that the line broadenings take place when they are red-shifted. This suggests that Call H and K lines are broaden when the umbral chromosphere falls into its own photosphere.

(4) The fluctuations of the peak intensity ratio are found to be firmly associated with their peak intensity fluctuations. Our correlation study shows that the umbral chromosphere becomes optically thicker when it falls, while it becomes optically thinner when it rises during the oscillations.

Analysis of High Resolution Balmer Line Spectra of a 3B Flare

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We have analyzed time series of Balmer line profiles taken from a 3B flare, appeared in Noaa Region 6891 on the 27th of October, 1992. Each set of the spectra was taken simultaneously for the first 10 minutes of the flare event by multi-channel spectrograph attached to the Solar Tower Telescope of Nanjing University. A total of 22 sets of and lines has been scanned by PDS to make their absolute intensity calibration.

Our analysis shows that the flare has reached its maximum activity in about 1 min. after its emergence. At the maximum the average electron temperature is found to be 35000 K and the red-shifted radial velocity reached to 40km/sec. After the flare maximum the line intensities, radial and turbulent velocities were declined gradually with time. The radial and turbulent velocity curves obtained from profiles are presented along with their integrated intensity curves. finally, their physical implications will be discussed.

CCD photometry of δ Scuti variables in the open clusters :

V650 Tau in Pleiades

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Real-time CCD differential photometry was carried out for a Scuti variable V650 Tau with 60cm reflector in SNU observatory. Total 3751 B differential magnitudes were taken on 14 nights between November and December 1993(about 81 hours of observations). We obtained very precise data($\sigma_m \leq 0.005^m$), because the comparison, check and variable stars were observed simultaneously(i.e. three stars are located in the same CCD field).

By applying the Fourier method and the multiple-frequency linear least square technique, we derived five frequencies of $f_1=17.0441$ c/d, $f_2=18.4952$ c/d, $f_3=25.2950$ c/d, $f_4=28.7725$ c/d, $f_5=32.6328$ c/d. We calculated the pulsational constant (day) for each frequencies from the observed parameters(T_{eff} , $Log g$, M_{bol}) and estimated the pulsational modes comparing these values with the theoretical ones of Fitch(1981). Our result shows that V650 Tau pulsates in