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<研 究 論 文>

Emitting Region of Sodium Lines in Solar Prominences

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We have calculated the emission spectra of hydrogen and sodium atoms in the cool part of prominence models which satisfy simultaneously the constraints of radiative transfer, statistical equilibrium and charge-particle conservations.

In the considered range of our model parameters, emission strengths of Hα and NaI D lines increase with the temperature and the total number density. Low pressure models raise the ionization rate highly but yield very weak NaI D line intensities, since these model prominences contain small amounts of free electrons and sodium atoms which have a deep relation with the formation of sodium lines. We find that sodium D lines should be emitted in the high pressure region of prominences, and that their intensities are difficult to attain in the cool core of any model prominence with a temperature as low as 4,000K. In order to explain consistently the spectral emissions of Hα and NaI D lines observed in quiescent prominences, a total number density higher than 4E+11/cm^3 and a temperature over 5,000K are required at least in the cool part of prominences.

Intrinsic Color of Intermediate Population II F-Stars

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We derived an empirical relation for the intrinsic colors of intermediate population II F-stars by analyzing the ***uvby***, Hβ photometry of Olsen (1983) in which ***uvby***, Hβ photometry of about 2,000 intermediate population II F-stars are included.

The distribution of $E(b-y)$ along the distances from the sun shows that our calibration is better than that of Crawford relation (1975) for the intrinsic colors of intermediate population II

F-stars.

Our derived relation is as flolows:

$$(b-y)_0=0.249+0.714\Delta\beta+4.131(\Delta\beta)^2-0.164\delta c_1-(0.324+1.029\Delta\beta)\delta m_1$$

Chromospheric Shock as a Driving Mechanism for Spicules

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A hydrodynamic evolution of the outer solar atmosphere is studied by solving a set of one-dimensional hydrodynamic equations. The numerical integration is performed by employing the *method of characteristics* with the use of artificial viscosity in treating an adiabatic shock, propagating in low density medium.

In the present study, we allowed the solar atmosphere initially in a hydrostatic equilibrium to be excited by a sinusoidal pulse at the lower boundary. Since the density in the chromosphere declines rapidly with height the upward propagating pulse steepens into a shock. We examined the strong chromspheric shock colliding with the transition region which thrusts the interface away, leaving the fast moving matters behind it.

We propose that the fast moving matters could be manifested as a spicular flow. Such a possibility is discussed in terms of global energetics.

Application of the Toomre's Mass Model to Disk Galaxy NGC 300

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To get the generalization of Toomre's mass model for the highly flattened galaxies, we adopt free parameters b_n instead of c_n $(c_n=a_n^{2n+2}\ b_n^2/(n-1)!)$. Series of the normalized Toomre's mass models ($G=V_{max}=R_{max}=1$, $n=1,\cdots,7$) are derived and normalized parameters a_n and b_n are determined by the iteration method. Replacing parameters a_n and b_n to a_n' $(=a_n\cdot R_{max})$ and b_n' $(=b_n\cdot V_{max}/R_{max})$, we can get the generalization of Toomre's mass model.

Applying this model to disk galaxy NGC 300, since the observed rotation curve of NGC 300 is flatter than Toomre's mass model $n=1$, two cases are used; obtaining parameters a_n and b_n from polynomial fitting of the observed rotation curve (case A) and from least square fitting between the observed rotation curve and model rotation curve (case B). In any cases, n has a fixed value as 1. Brandt's mass model is also discussed, which has a shape parameter n as 1.4.

Calculated total mass and total mass to luminosity ratio are $3.3\times10^{10}M_{\odot}$, 12.1 for case A and $2.8\times10^{10}M_{\odot}$, 10.3 for case B. In case of Brandt's model, the values are $4.2\times10^{10}M_{\odot}$ and 15.4. Other properties such as the surface density distribution, space density distribution and surface brightness profile are also discussed.