deep neural network (DNN) to the inversion code to reduce the cost of calculating the physical parameters. We train the models using pairs of absorption line profiles from FISS and their 13 physical parameters (source functions, Doppler velocities, Doppler widths in the chromosphere, and the pre-determined parameters for the photosphere) calculated from the spectral inversion code for 49 scan rasters (~2,000,000 dataset) including quiet and active regions. We use fully connected dense layers for training the model. In addition, we utilize a skip connection to avoid a problem of vanishing gradients. We evaluate the model by comparing the pairs of absorption line profiles and their inverted physical parameters from other quiet and active regions. Our result shows that the deep learning model successfully reproduces physical parameter maps of a scan raster observation per second within 15% of mean absolute percentage error and the mean squared error of 0.3 to 0.003 depending on the parameters. Taking this advantage of high performance of the deep learning model, we plan to provide the physical parameter maps from the FISS observations to understand the chromospheric plasma conditions in various solar features.

[구 SS-04] Spectroscopic Detection of Alfvénic Waves in the Chromosphere of Sunspot Regions

Jongchul Chae[1], Kyuhyoun Cho[1], Valery M. Nakariakov[2,3], Kyung-Suk Cho[4,5] and Ryun-Young Kwon[4]
[1]Seoul National University, [2]University of Warwick [3]Kyung Hee University, [4]Korea Astronomy and Space Science Institute, [5]University of Science and Technology

Transverse magnetohydrodynamic waves often called Alfvénic (or kink) waves have been often theoretically put forward to solve the outstanding problems of the solar corona like coronal heating, solar wind acceleration, and chemical abundance enhancement. Here we report the first spectroscopic detection of Alfvénic waves around a sunspot at chromospheric heights. By analyzing the spectra of the Hα line and Ca II 854.2 nm line, we determined line-of-sight velocity and temperature as functions of position and time. As a result, we identified transverse magnetohydrodynamic waves pervading the superpenumbral fibrils. These waves are characterized by the periods of 2.5 to 4.5 minutes, and the propagation direction parallel to the fibrils, the supersonic propagation speeds of 45 to 145 km s^{-1}, and the close association with umbral oscillations and running penumbral waves in sunspots. Our results support the notion that the chromosphere around sunspots abounds with Alfvénic waves excited by the mode conversion of the upward-propagating slow magnetoacoustic waves.

[구 SS-05] A self-consistent model for the formation and eruption of a solar prominence

Tetsuya Magara[1,2]
[1]Department of Astronomy and Space Science, Kyung Hee University, [2]School of Space Research Kyung Hee University

The present study is focused on origins of the flow and magnetic structure involved in the formation and eruption of a solar prominence. To clarify them, we performed an MHD simulation based on the 3-dimensional emerging flux tube (3DEFT) model, in which self-consistent evolution of a flow and magnetic field passing freely through the solar surface was obtained by seamlessly connecting subsurface dynamics with surface dynamics. By analyzing Lagrangian displacements of magnetized plasma elements, we demonstrate the flow structure which is naturally incorporated to the magnetic structure of the prominence formed via dynamic interaction between the flow and magnetic field.

[구 SS-06] Negative Turbulent Magnetic β Diffusivity effect in a Magnetically Forced System

Park Kiwan & Cheoun Myung-Ki
Soongsil University

We studied the large scale dynamo process in a system forced by helical magnetic field. The dynamo process is basically nonlinear, but can be linearized with $\alpha\&\beta$ coefficients and large scale magnetic field $\overline{B}$. This is very useful to the investigation of solar (stellar) dynamo. A coupled semi-analytic equations based on statistical mechanics are used to investigate the exact evolution of $\alpha\&\beta$. This equation set needs only magnetic helicity $\overline{H}_M(\equiv\langle\overline{A}\cdot\overline{B}\rangle, \overline{B}=\nabla\times\overline{A})$ and magnetic energy $\overline{E}_M(\equiv\langle\overline{B}^2\rangle/2)$. They are fundamental physics quantities that can be obtained from the dynamo simulation or observation without any artificial modification or assumption. α effect is thought to be related to magnetic field amplification. However, in reality the averaged α effect decreases very quickly without a