Session 2

Investigation of the magnetic field structure of dark filaments by using a spectro-polarimetric observation with He I 1083 nm

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Solar filaments are the dense cool plasma clouds in the solar corona. They are supported by the helical coronal magnetic field. However, the models are still under argument; one is the normal polarity model proposed by Kippenhahn & Schlueter (1957), and the other is the reverse polarity model proposed by Kuperus & Raadu (1974). To understand the mechanism that the filaments become unstable before the eruption, it is critical to confirm the magnetic structure of solar filaments. In this study, we performed the spectro-polarimetric observation with the He I 1083 nm line to investigate the magnetic field structure of dark filaments. The observation was carried out with the Domeless Solar Telescope at Hida Observatory which achieves a polarization sensitivity of 3.0×10^-4. We obtained 9 samples of quiet sun (QS) filaments and 10 samples of active region (AR) filaments. As a result of the analysis of full Stokes profiles of QS filaments, we found that the linear and circular polarization signals of 1.6 - 3.0×10^-3 and 0.4 - 1.8×10^-3, respectively. By comparing with the synthetic Stokes profiles calculated with HAZEL (Assensio Ramos & Trujillo Bueno 2008), we confirmed that the observed linear and circular polarization signals were caused by the Hanle effect and the Zeeman effect, respectively. For the QS filaments, the field strengths were estimated as 20 - 50 G. We also estimated the directions of the transversal components of the magnetic field on dark filaments. We found that the direction was roughly along the direction of the main body of the filaments. In our presentation, we will also discuss the field strengths and the magnetic field structures of AR filaments based on our observation.