

## **The statistical analysis of doppler velocity field and magnetic structures around the cancellations in the quiet Sun**

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**Abstract.** The cancellation is defined as a convergence and a disappearance of the two opposite polarities and thought as a main process of the flux disappearance in the photosphere. There are two scenarios explaining the photospheric cancellations, i.e. the 'U-loop emergence' and 'Omega-loop submergence'. Because they are totally different in the flux transport between the under photosphere and above the photosphere, it is important to distinguish these scenarios. Some authors acquired the result that supports 'Omega-loop submergence' but it is still under debate (Harvey et al., 1999; Chae et al., 2004; Kubo & Shimizu, 2007; Yang et al., 2009). We investigate the spatial structures and time evolutions of Doppler velocity field and horizontal magnetic field around the cancellations in the Quiet Sun by using Spectro polarimeter (SP) and Filtergram (FG) onboard Hinode. We used the data sets of the quiet sun to find relatively isolated cancellations. We reported that the horizontal field connecting the colliding opposite polarities and stable red-shift downflow patches around the cancellation sites in Hinode 2nd conference, which supports the 'Omega-loop submergence'. Owing to the stability and high-resolution of FG data, we could discuss the time evolution of Doppler velocity structures. In this presentation, we will discuss the Doppler velocity structures of the 12 cancellation events from the same analysis. There are characteristic downflows in 7 cancellations, upflows in 2 cancellations, and no characteristic Doppler velocity in 3 events. We also analyze the EUV brightenings corresponding to the cancellations in 2 events. An EUV brightening is interpreted as a reconnection in the solar atmosphere above the cancellation. There is no EUV brightening in one event. But in the other event there is an EUV brightening before the cancellation and it vanishes at almost the same time as the cancellation. We interpreted these results that the cancellation is dominantly interpreted as 'Omega-loop submergence's.