

# Doppler velocities of the solar photosphere very close to the limb observed with Hinode SOT 

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The Doppler velocities observed in the solar photosphere are known to show significant center-to-limb variation. The convective blueshifts observed near the disk center decrease toward the limb and they turn into redshifts, which is called the limb effect. This is produced by the projection of the 3D atmospheric structure along the line of sight. The previous studies using ground-based telescopes and numerical simulations were done from 0 to 80 degrees in the heliocentric angle. To study the limb effect very close to the limb, we analyzed the Doppler velocities of the Fe I 630.15 nm line using Hinode SOT/SP data. The high spatial resolution of the SOT enables us not only to resolve the photospheric structure but also to see the line as an emission profile just above the limb. The data shows decreases in the blueshift toward the limb and almost constant above 80 degrees. Classifying the spectra into those from granules, intergranular lanes, and magnetic regions, we found the granules show the center-to-limb variation, but the intergranular lanes do not show it. The bisector analysis of the line profiles in the granules show the largest velocity difference between line core and near wing of $300 \mathrm{~m} / \mathrm{s}$ at around 75 degrees. The emissions of the Fe I line above the limb are clearly blueshifted compared to the absorptions within the solar disk near the limb. The 3D structures of the solar surface could be inferred from this analysis of the Doppler velocities near the solar limb.

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