Variation Asymmetry of Chromosphere Spicule Doppler Velocities and Half-widths

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During 25.09.2012 and 17,18,19.10.2012 were obtained new series of Hα spicule spectrograms for 7 500 km heights in the solar chromosphere using the 53-cm large non-eclipsing coronagraph of the Abastumani Astrophysical Observatory (Georgia). Spectrograms in Hα line were obtained in a second series of the spectrograph, where reversed dispersion equals to 0.96 Å/mm. Doppler velocities and half-widths of 10 spicules were measured with the cadence of 4.5s and standard error equals to ±0.3 km/s and 0.03 Å. Life times of almost all measured spicules were 12-16 min, therefore they resemble the type I spicules. To study and find periodical changes of Hα FWHM, we used the Lomb periodogram algorithm for unevenly distributed time series. We also processed Doppler velocities using the same algorithm for the same spicules on the same images. The confidence levels for our data equals to 9.0 for 95% and 10.7 for 99% in power units; mainly, the periods are above 2 min (> 180 s). The most of periods fall between 5-9 min (300-540 s). In order to see the possible relations between the changes of Hα FWHM and Doppler velocities, we performed Low Pass FFT Filtering with different cut-off frequencies: 60 s (0.016 Hz), 100 s (0.01 Hz) and 200 s (0.005 Hz). All 10 spicules show clear anti-correlation features, especially for the longest periodical changes.