

Differential Character of the Rotation of the Solar Coronal Holes

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Abstract

Solar differential rotation is one of the key issues in solar physics. The study of its characteristics is of particular importance in determining the mechanism of solar activity cycle.

Two basic methods are used to study the problem. One is spectroscopic and is based on the Doppler effect of determining the radius of the light source. This method allows evaluating angular velocities of the emitting plasma layer.

Our interest in ongoing work is to study the coronal holes without compromising limitation on the above-mentioned material. We refused to filter the data and developed a unified approach for the whole range of latitudes. We do not study the rotation rate of each coronal hole, but the array of observations of all coronal holes is considered as the characteristics of the given latitude..

For the study, we used the data from the coronal hole catalog (<http://www.solspanet.eu>) compiled within the framework of the project SOLSPANET ("Solar and Space Weather Network of Excellence"). The catalog was compiled on the basis of SDO/AIA data that was observed on 193 Å wavelength. We obtained and analyzed 9933 records for 529 coronal holes from 2014 and 2309 records for 131 coronal holes from 2015.

According to the results of the work, the differential nature of rotation of the coronal holes can be regarded as the established fact. The raised rotation rates in polar regions can be caused by the mixed velocity of coronal holes of different generations in the regions and its study is subject to future research.

The study has clearly demonstrated north-south asymmetry of latitudinal distribution of rotation rates.