

## Radial profile of sunspot magnetic field on the SDO data

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The spatial distribution of the vertical (with respect to the surface photosphere) magnetic field in a sunspot plays an important role in modeling the temperature-density characteristics of sunspot, in the calculation of its total energy, in the study of magnetic field scillations of sunspots and in many others tasks. A number of radial field distributions, such as the Broxon's formula, is discussed in the literature, but the generally accepted, "canonical" profile of the vertical field in a sunspot does not exist on today. Magnetograms obtained with the HMI device of the Solar Dynamic Observatory, due to their high spatial resolution, provide a good opportunity to get closer to solving this problem. We have studied 30 regular round-shaped unipolar sunspots, situated near the center of the solar disk, without any changes of their configuration or the magnetic field strength during a day or two. Four radial cuts were taken on the magnetograms for each of these 30 sunspots. The magnetic field strength measured along a cut was normalized to the maximum value of the field in the sunspot, all distances are measured in units of the radius of the umbra of the sunspot. It is shown that the radial profile of the vertical field averaged over all studied sunspots has a smooth bell-shaped form and can be well described by the analytic formula for a magnetic monopole, with the depth of immersion into the convective zone of the Sun close to the radius of the sunspot umbra.