Intensity Contrasts of Bright Solar Surface Features in Continuum and Absorption Bands at Disk Center

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Many solar irradiance reconstruction techniques make use of one-dimensional (1D) static atmosphere models to reproduce the radiative output of magnetic and quiet features observed over the solar photosphere. In the past years, several sets of models have been presented in the literature, each reproducing spectral irradiance variations with different degrees of accuracy. However, three dimensional magnetohydrodynamic (MHD) simulations of the solar photosphere are known to better reproduce the fine spatial and temporal structure of the solar photosphere, rendering them promising tools for improving our understanding of and capability to reproduce irradiance variations.

In this work we compute the photometric intensity contrast in the blue continuum (409.4 nm, FWHM 0.3 nm), the red continuum (607.1 nm, FWHM 0.5 nm), and the g-band (430.6 nm, FWHM 1.2 nm) at disk center (μ=1) using 1D FAL models, and 3-D MHD simulations, and we compare them with full-disk observations obtained with the Rome Precision Solar Photometric Telescope (PSPT). We find that the most recent FAL 2011 models best agree with results from MHD simulations, while comparison with observations is strongly hampered by scattered-light effects.