The Sun on Two-color Diagrams in Different Photometric Systems

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In papers [1] and [2] we have calculated color indices for the Sun in the *UBV, WBVR* [3], and Vilnius [4] photometric systems. The results of the calculations and observing data for G2 V stars in these systems we plotted on a two-color diagram. Unfortunately, the samples of G2 V stars observed in these systems overlap slightly one another and have noticeably distinguished numbers of members. An analysis of the results has shown that in the *UBV* and *WBVR* systems place of the Sun is shifted to the late star side along the *(B-V)* axes and to side of early stars along the *(U-B)* and *(W-B)* axes. In the Vilnius system the Sun lies nearly in the center of the G2 V star area. To a certain extent, the cause of these contradictions may be the random collection stars in the used samples. But most probably that cause is a comparing procedure, when we compare, strictly speaking, two heterogeneous quantities: observed color indices for G2 V stars and synthetical color indices for the Sun, obtained in the general case with instruments with nonidentical response curves.

In the present article we have decided to exclude the effect of response curves and to compare synthetic color indices of the Sun with synthetic color indices for a group of G2 V stars which were included in the Alma-ata spectrophotometric catalogue [6], and were selected by us earlier [5].. For the Sun we used data from a paper of Makarova et al. [7]. In that paper, the solar energy distribution was derived as a weighted mean from results of five investigations. The standard error of the energy distribution is equal to 1.5% in the ultraviolet and blue regions and decreases to 0.4% in the red.

Color indices of the Sun and stars were computed in four photometric systems (*UBV, WBVR, uvby* [8], [9] and Vilnius [4]) using the same stars in all systems. The result is that the Sun lies within of the G2 V area on all two-color diagrams. We think of that conclusion as being rather positive because only two basic quantities are compared in the case: solar energy distribution and the scale of the Alma-Ata spectrophotometric catalogue. Errors of an individual star energy distribution are quasi-random if a sample is rather extensive and increase a point scatter only without moving a central line. A hidden systematic error of the spectrophotometric catalogue [6] and errors of the solar energy distribution are apparently small, as it is impossible that they cancel each other to place the Sun near the central line.

References

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