AN OUTWARD MOTION OF YOUNG STARS WITH RESPECT TO OLD STARS

Arthur R. Upgren
Van Vleck Observatory

Space motions are calculated for 145 dK2-M2 stars with radial velocities and with parallaxes and proper motions determined and published at the Van Vleck Observatory. The stars are divided into young and old disk components kinematically and also according to the age-sensitive CaII emission intensities. Rigorous solutions for the solar motion and velocity ellipsoid were calculated for each population group using three methods of weighting errors in parallax, proper motion and radial velocity. All methods show a mean motion of the young stars outward away from the galactic center of about ten km/sec when referred to the old stars. Details are presented by Upgren (1978). The conclusion appears to confirm an outward motion suggested by Kerr (1962) from 21-cm observations. It is reasonable to inquire whether a similar outward motion can be seen in the space motions of other stars. Unlike the Van Vleck parallaxes combined with the most rigorous of the weighting methods used here, earlier results may be too insensitive to measure such a motion. Nonetheless a search of some of the existing literature shows that a small outward motion is consistent with sources so far examined. Of the motion solutions listed by Delhaye (1965) only two involve space motions of stars covering most of the main sequence. For stars with velocity dispersions similar to ours, both studies show a small outward motion of the order of five km/sec (for the A dwarfs relative to the generally older F and G dwarfs). The A dwarfs brighter than $5\overset{m}{.}5$ (Eggen 1965) have a planar motion distribution very similar to our young dK-M stars and both groups possess a mean motion close to the basic and standard solar motions. These last are mostly based on young stars and the solar motion should be reexamined relative to stars of all ages. It might be worthwhile to redetermine the mean motions of stars for which age-dependent parameters are now available, such as the F-stars with uvby measures or the giants with DDO photometry, since the local standard of rest appears to be a function of stellar age. This study was supported by grant AST77-26554 of the National Science Foundation.

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