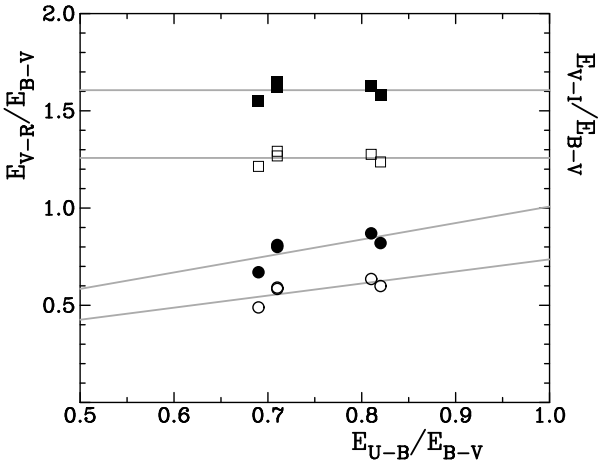

Fig. 1. Derived Johnson system (filled symbols) and Kron-Cousins system (open symbols) reddening ratios E_{V-R}/E_{B-V} (circles, lower) and E_{V-I}/E_{B-V} (squares, upper) for fields studied by Johnson (1968). Gray lines denote the implied dependences on reddening slope E_{U-B}/E_{B-V}.

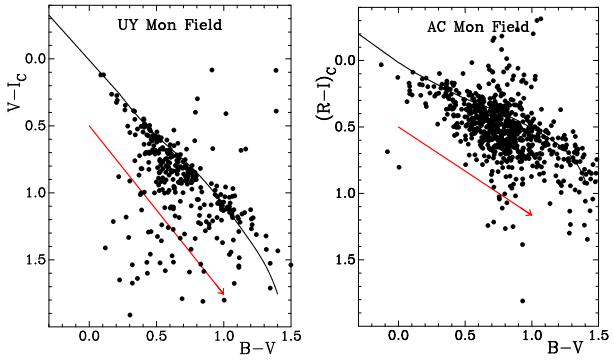

Fig. 2. Two-color diagrams, V–I_C versus B–V for the field of UY Mon (left), and $(R$–$I)_C$ versus B–V for the field of AC Mon (right), showing the intrinsic color relations adopted (solid curves). Reddening lines specific for the fields are shown separately in red for $E_{B-V} = 1.0$, with arrows denoting the direction of increasing reddening. The color figure can be viewed online.

grams, V–I_C versus B–V and $(R$–$I)_C$ versus B–V, constructed from CCD $BV(RI)_C$ photometry for stars in the fields of the variables. Reddening lines appropriate for each field were adopted as indicated above, specifically the adopted reddening slopes E_{U-B}/E_{B-V} were 0.73 for VY Sgr, AY Sgr, and V1882 Sgr, 0.75 for HZ Per and OT Per, 0.76 for FO Cas, IO Cas, EW Aur, YZ CMa, CN CMa, BD Pup, BE Pup, and LR Pup, and 0.77 for UY Mon and AC Mon. The reddening slopes E_{V-I}/E_{B-V} and E_{R-I}/E_{B-V} were next obtained through interpolation and computation with the data of Figure 1, resulting in values on the Kron-Cousins system of $E_{V-I}/E_{B-V} = 1.257$ for all fields and values of E_{R-I}/E_{B-V} of 0.689, 0.677, 0.670, and 0.664, respectively, for the Cepheid fields listed above. Examples are shown in Figure 2, where the derived reddening slopes for UY Mon and AC Mon are $E_{V-I}/E_{B-V} = 1.257$ and $E_{R-I}/E_{B-V} = 0.664$ according to the inferred reddening ratio $E_{U-B}/E_{B-V} = 0.73$. Note that the adopted field reddening lines are unchanging for E_{V-I}/E_{B-V} and exhibit only small variations for E_{R-I}/E_{B-V}.

Initial tests with two-color diagrams using intrinsic $BV(RI)_C$ colors for dwarfs from Caldwell et al. (1993) revealed small anomalies in the inferred E_{B-V} reddenings derived from the two diagrams, as well as an overabundance of unreddened and negatively-reddened stars relative to the intrinsic relation, not explainable as luminosity effects (Caldwell et al. 1993). Such non-physical results suggested the need for slight corrections to the intrinsic colors used with the present data sets, which are normalized to the Kron-Cousins system. Small adjustments to the intrinsic relations for late B-type and A-type dwarfs to make them bluer were therefore tried, using alternative intrinsic colors from Johnson (1966) adjusted to the Cape system (Fernie 1983). That produced greater consistency in the derived reddenings and better agreement for unreddened stars, and was adopted throughout the remainder of the study. The intrinsic colors corresponding to such changes are presented in Table 1 for reference purposes, where they are compared with the Caldwell et al. (1993, SAAO) colors for dwarfs, which were adopted for all other stars. Given that the analysis was restricted to stars that dereddened uniquely to the AF-dwarf relation, the modification affects the resulting space reddenings, but only to a minor extent. Likely B-type stars in the field of each Cepheid were only used when analyzing 2MASS colors for the stars.

Reddening lines run nearly parallel to the intrinsic relations for B-dwarfs and KM-dwarfs, particularly in V–I_C versus B–V diagrams, which is why the analysis was restricted to stars indicated to be likely AF-dwarfs, which are reasonably plentiful in each field. The slope of the intrinsic relation for AF-dwarfs relative to the effects of interstellar reddening in the $BV(RI)_C$ system results in sufficient separation, particularly in $(R$–$I)_C$ relative to B–V, to produce unique photometric dereddening solutions for