A COMPUTER METHOD FOR SPECTRAL CLASSIFICATION

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Spectroscopic parallaxes are an important tool for determining distances of individual stars in the Galaxy. Unfortunately, for many astrophysical applications this method does not produce sufficiently accurate results for distant stars. Therefore, we started an attempt to improve the accuracy of spectroscopic parallaxes by evaluating spectroscopic temperature and luminosity criteria such as those of the MK classification spectrograms which were analyzed automatically by means of a suitable computer program. If necessary, the grain noise is reduced by Fourier filtering techniques. Then, the computer derives an approximate spectral type and the wave length scale from selected prominent spectral features. As a next step the computer searches the spectrum for adsorption features and produces an internal catalog of detectable absorption lines. Then, depending on the approximate spectral type, line ratios, line widths, and line depths of selected lines are calculated and compared to the corresponding values of standard stars. Since the investigation is still in progress, no final result on the achievable accuracy can be given here. However, preliminary results indicate that spectroscopic parallaxes derived by the computer method are at least as accurate as those derived from the conventional visual classification technique. A more detailed account of this investigation will be published elsewhere.

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DISCUSSION

CAYREL de STROBEL: Could your computer method of spectral classification give us a temperature parameter as well as a gravity parameter?

APPENZELLER: In principle yes, provided that the temperature criteria used by the computer are calibrated correspondingly.

SHIPMAN: Does your computer program take line blends such as those that affect Hγ in the B stars into account?

APPENZELLER: If possible the computer separates blended lines by fitting line profiles to the individual components. If the lines are too close for this procedure, blends are treated as one absorption feature. (The Hγ line in early type stars can usually be separated from the adjacent weak absorption features.)

KODAIRA: How far down to faint objects can you apply this method? I ask this because a system of spectral classification must be applicable as homogeneously as possible.

APPENZELLER: This depends of course on the telescope, spectrograph and detector which you use. We use spectrograms of the same dispersion and widening as for conventional MK - classification. Thus, for a given instrument we have the same limiting magnitude.

KODAIRA: Do you mean that the method is independent of the dispersion of the spectra?

APPENZELLER: For the criteria used in the computer program we need a spectral resolution of about 2 Å. This requires a minimum dispersion of about 100 Å/mm if the spectra are recorded directly and about 40-50 Å/mm for image tube spectrograms.

LESH: How does the computer program distinguish between stellar and interstellar features, especially in regard to the K line? I should think that the presence of a strong interstellar K line in an early-type star would often lead the computer to conclude that the classification criteria are "contradictory".

APPENZELLER: If the computer recognizes the star as an early type star, the K-line is not used. In this case an interstellar K line has no effect. If the K line is so strong that the star is initially classified as "late type" the computer will not be able to assign a spectral type to the star. It will simply report that the spectrum does not fit into the classification scheme.

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