FOREWORD

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IAU Colloquium 66 on 'Problems of Solar and Stellar Oscillations' was held at the Crimean Astrophysical Observatory, U.S.S.R., on 1–5 September, 1981. The principal purpose of the colloquium was to study the low-amplitude oscillations of the Sun and, to a lesser extent, to consider similar oscillations of other stars.

Much of the emphasis of the discussions was on the diagnostic value of the oscillations. In the last few years we have become aware that the frequencies of the five-minute modes of high degree, which constitute the major component of the oscillations discovered twenty years ago by Evans and Michaud, can be used to put quite tight bounds on the stratification of the solar convection zone. These permit a calibration of solar models computed from so-called standard evolution theory. Modes of low degree penetrate beneath the convection zone to the core of the Sun, and can in principle test the evolution theory. Therefore there was considerable interest in the reports of the latest observations of such modes. Broadly speaking, those observations confirm the calibration by the high-degree modes, but there remain some systematic discrepancies that demand some revision of the theory.

Besides the gross aspects of evolution theory, there are also more intricate details to be understood. For example, how are oscillations influenced by sunspots, or the large-scale convective flow? And, of course, what is the 160^{m} oscillation?

The mechanism by which dynamical oscillations are excited is of considerable interest. It is likely that nonlinear interactions between the modes and the convection, and between the modes themselves, play a crucial role in determining the oscillation amplitudes. Some progress in this difficult area of investigation is reported in these proceedings.

The aim of the observer is to resolve some aspects of the dynamics of the stellar atmosphere. When many modes are present, this can be a formidable task, demanding careful diagnostic techniques. Advances in the study of the interaction between radiative transfer and the dynamics of the oscillations, which has a direct bearing on the interpretation of the data, and in the statistical analyses of the raw data, are reported here.

In principle, full-disk measurements, whether they be of the radiation intensity or of spectrum-line shifts, can be made for other stars. There is already observational evidence that other late-type main sequence stars undergo oscillations similar to the five-minute oscillations of the Sun, but the individual modes have never been resolved. Issues concerning stellar evolution theory upon which the eventual resolution of such modes may bear are discussed in these proceedings. Furthermore, theoretical estimates of the amplitudes of the oscillations are reported, to guide the observers in their initial selection of suitable stars. Finally, there is a look to the future, in a summary of plans for observations, and what one might hope to be achieved.

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