

THEORETICAL EIGENFREQUENCIES OF SOLAR OSCILLATIONS OF LOW HARMONIC DEGREE l IN FIVE-MINUTE RANGE*

(Invited Review, Abstract)

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Abstract. We have calculated eigenfrequencies of radial and nonradial p -mode oscillations with low harmonic index l ($l = 0, 1, 2, 3$, and 4) for a standard solar model with normal composition and approximately the correct age. It is found that theoretical eigenfrequencies calculated for our standard model agree approximately with observed peaks in the power spectra for the full-disk five minute oscillation of the Sun (Claverie *et al.*, 1980; Grec *et al.*, 1983; Scherrer *et al.*, 1983) in agreement with other recent works (Christensen-Dalsgaard and Gough, 1980; Scuflaire *et al.*, 1981). However, there still remains a slight discrepancy between theory and observations in such a sense that the theoretical eigenfrequencies are slightly lower than observations (see Figure 1).

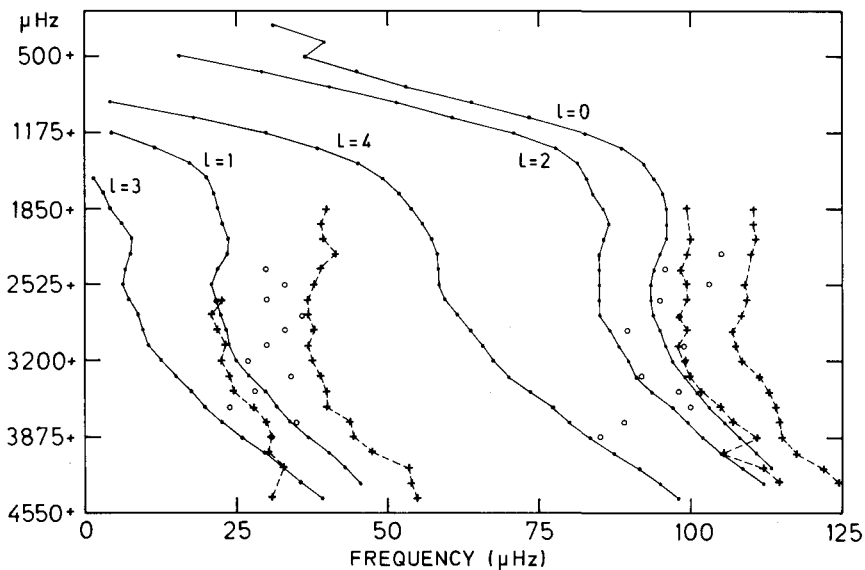


Fig. 1. Superposed frequency diagram for the 135 μHz steps. Dots, open circles, and crosses indicate the calculated theoretical eigenfrequencies, the observations by Claverie *et al.* (1980) in 1979, and those by Grec *et al.* (1983), respectively.

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Eigenfrequencies of nonradial p -modes with high degree l for the same model are also calculated for comparison with observations of the conventional five-minute oscillation with shorter horizontal wavelength. It is found that theoretical eigenfrequencies lie slightly above the observed ridges in the diagnostic (k, ω) -diagram, which is in accord with Ulrich and Rhodes (1977) and Berthomieu *et al.* (1980) because our standard model has a slightly shallow convective zone. It remains to be seen whether improvement in the equilibrium model can remove this small discrepancy, concurrently with a better agreement between theory and observation for the whole-disk oscillations of low degree.

A full account of this work will be found in Shibahashi and Osaki (1981).

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