

THE COUPLING COEFFICIENTS OF RADIAL PULSATION IN THIRD ORDER

T. ISHIDA

Nishi-Harima Astronomical Observatory, Ohnadesan, Sayo-cho, Hyogo 679-53, Japan

R. TAKANO

Astronomical Institute, Tôhoku University, Sendai 980, Japan

F. YAMAKAWA

Space System Dept., Fujitsu Ltd., Nakase 1-chome, Mihama-ku, Chiba 261, Japan

and

M. TAKEUTI

Astronomical Institute, Tôhoku University, Sendai 980, Japan

Abstract. The third order theory of coupling is discussed regarding the radial pulsation of stellar models.

The coupling constant of the stellar radial pulsation have been studied by various authors in the second order (Schwarzschild and Savedoff 1949, Takeuti and Aikawa 1981, and Takeuti *et al.* 1992). As demonstrated by Buchler and Goupil (1984), the third order terms play essential role in non-linear finite-amplitude oscillation. Therefore, the study of coupling in second order theory has its proper limit. Takeuti and Aikawa (1981) used an artificial third-order term for excitation in the form of van der Pol. We derived third order terms of coupling coefficients along the line of Schwarzschild-Savedoff (1949) and Takeuti *et al.* The expressions are not so complicated at least for adiabatic pulsation, but not so easy to make overview in the nonadiabatic case.

References

- Buchler, J.-R. and Goupil, M.-J. : 1984, *Astrophysical Journal* **279**, 394.
Schwarzschild, M. and Savedoff, M. P. : 1949, *Astrophysical Journal* **109**, 298.
Takeuti, M. and Aikawa, T.: 1981, *Sci. Reports Tôhoku Univ., Eighth Ser.* **2**, 106.
Takeuti, M. Yamakawa, F., and Ishida, T. M. : 1992, *Publications of the ASJ to be published*.

Astrophysics and Space Science **210**: 349, 1993.

© 1993 Kluwer Academic Publishers. Printed in Belgium.