New core/envelope chemical profiles for pulsating DA white dwarfs

L. G. Althaus[1,2], A. H. Córsico[1,2], A. Bischoff-Kim[3], A. D. Romero[1,2], I. Renedo[4,5], E. García-Berro[4,5], and M. M. Miller Bertolami[1,2]

[1] *Facultad de Ciencias Astronómicas y Geofísicas, Universidad Nacional de La Plata, Paseo del Bosque s/n, (1900) La Plata, Argentina*

[2] *Instituto de Astrofísica de La Plata, IALP (CCT La Plata), CONICET-UNLP*

[3] *Department of Chemistry, Physics and Astronomy, CBX 82, Georgia College & State University, Milledgeville, GA 31061, USA*

[4] *Departament de Física Aplicada, Universitat Politècnica de Catalunya, c/Esteve Terrades 5, 08860 Castelldefels, Spain*

[5] *Institute for Space Studies of Catalonia, c/Gran Capità 2–4, Edif. Nexus 104, 08034 Barcelona, Spain*

New chemical profiles for the core and envelope of white dwarfs appropriate for pulsational studies of ZZ Ceti stars are presented. These profiles are the result of the complete evolution of progenitor stars, evolved through the main sequence and the thermally-pulsing asymptotic giant branch (AGB) stages, and from time-dependent element diffusion during white dwarf evolution. We discuss the importance of the computation of the thermally-pulsing AGB phase and diffusion for the chemical profiles expected in the outermost layers of ZZ Ceti stars. We find a strong dependence of the outer layer chemical stratification on the stellar mass. We also perform adiabatic pulsation calculations and discuss the implications of our new chemical profiles for the pulsational properties of ZZ Ceti stars. We find that the whole $g-$mode period spectrum and the mode-trapping properties of these pulsating white dwarfs as derived from our new chemical profiles are substantially different from those based on chemical profiles widely used in existing asteroseismological studies. Thus, we expect the asteroseismological models derived from our chemical profiles to be significantly different from those found thus far.