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Computational Study of White Dwarf Stars JOSE PACHECO, AJIT HIRA, DANELLE JARAMILLO, Northern New Mexico College — We begin our interest in the computational simulation of the astrophysical phenomena with a study of white dwarf stars. Of particular interest to astrophysicists are the conditions inside a white dwarf star in the time frame leading up to its explosive end as a Type Ia supernova, for an understanding of the massive stellar explosions. In addition, the studies of the evolution of white dwarfs could serve as promising probes of theories of gravitation. First, we set up the equations of equilibrium for the star of interest. Then we derived the appropriate equation of state. Next, a FORTRAN computer program was developed to implement our model for white dwarfs. This code allows for different sizes and masses of stars. Simulations were done in the mass interval from 0.4 to 0.8 solar masses. Our goal was to obtain both atmospheric and orbital parameters. The computational results thus obtained are compared with relevant observational data. The data are further analyzed to identify trends in terms of sizes and masses of stars. We hope to extend our computational studies to red giant stars in the future.

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