Turkish Journal of Physics

Turkish Journal

of

Physics

Keywords
Authors

phys@tubitak.gov.tr

Scientific Journals Home Page

Effects of Opacity on Stellar Radii and Their Relevance to Observational Data

Gülay İNLEK[1], Aysun BÖKE[1], Oktay YILMAZ[2], Edwin BUDDING[2,3]
[1]Physics Department, Balıkesir University, Çağış Campus, 10145, Balıkesir-TURKEY
[2]Physics Department, Çanakkale Onsekiz Mart University, 17100 Çanakkale-TURKEY [3]Carter Observatory, PO Box 2909, Wellington-NEW ZEALAND

Abstract: We have examined the effect of varying opacities on envelope structure with the aid of Paczynski's public domain stellar modelling programs. For this, we prepared new opacity tables from the data of Kurucz [1], using Lagrange interpolation to obtain the tabular values. We compare the results of these Kurucz opacities with similar tabulations from Huebner et al. [2], Iglesias and Rogers [3], Rogers and Iglesias [4] and Iglesias and Rogers [5]. We have checked calculations for the same ranges of stars considered originally by Schwarzschild [6], and compared our findings, using newer opacity data, with those of other sources. We consider how such calculations relate to high accuracy observational data, with the well-observed planetary eclipsing system V 376 Peg (HD 209458), providing a guideline towards data of similar accuracy in the near future. Current accuracies on absolute radii and masses derivable from eclipsing spectroscopic binaries are conservatively estimated at \sim 1%. The effects of revised opacity calculations on the radii of stars of intermediate mass are several times greater than this (5-10% for constant values of other parameters), so that eclipsing binary data should have good potential for independent tests of opacity theory across a wide range of stellar types.

Key Words: Stars: general-structure: modelling, opacity tables, observational tests, eclipsing binary data

---

Turk. J. Phys., **32**, (2008), 65-78.
Full text: pdf
Other articles published in the same issue: Turk. J. Phys.,vol.32,iss.2.