

This is a review text file submitted electronically to MR.

**Reviewer:** Znojil, Miloslav

**Reviewer number:** 13388

**Address:**

NPI  
250 68 Rez  
Czech Republic  
znojil@ujf.cas.cz

**Author:** This line will be completed by the MR staff.

**Short title:** This line will be completed by the MR staff.

**Control number:** 1798005

**Primary classification:** 81Q05

**Secondary classification(s):** 34L40

**Review text:**

Radial Dirac equation is a coupled system of two ordinary differential equations for two independent components of so called wave function. People usually construct its solutions starting from a given potential and imposing some suitable (say, bound-state) boundary conditions. In this paper [and, in fact, in all the four (self-)quoted papers (co-)authored by J. Franklin] just the single energy level is considered. It is postulated, moreover, that its wave function has a very special structure [cf. eq. (6)] and that the potential has also a very special structure [cf. eq. (1)]. Then, a thorough discussion of properties of the resulting ground-state solution is offered.

I must admit that I discussed a similar problem recently and found [M. Z., Mod. Phys. Letters A, Vol. 14, No. 13 (1999) 863 - 868] that its solution (as well as the solution of a much broader class of problems of this type) is entirely elementary [cf. eq. (2) in my text]. The problem only starts to be nontrivial when one contemplates two energy levels at once (in this case I offered a solution) or more energy levels at once [as far as I know, such a type of solution has only been obtained in non-relativistic case by A. G. Ushveridze and can be found in one of appendices of his book "Quasi-Exactly Solvable Models in Quantum Mechanics" (IOPP, Bristol, 1994)].