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Full major-shell calculation for states that are degenerate in a single-j-shell calculation ALBERTO ESCUDEROS, LARRY ZAMICK, Rutgers University, SHADOW ROBINSON, University of Southern Indiana — In a previous work [1], we explained why certain states were degenerate in the single j shell for an interaction in which the isospin $T = 0$ two-body matrix elements were set to zero. The degeneracy splitting was recovered by reintroducing the full interaction. In this work, we perform a full fp-shell calculation with the FPD6 interaction to obtain these energy splittings; the interaction obtained by setting the $T = 0$ matrix elements to zero but keeping the $T = 1$ ones unchanged will be called T0FPD6. Comparing the results with FPD6 and T0FPD6, we can see that most of the splitting in a complete shell calculation (but not all) comes from the $T = 0$ part of the interaction. For example, the $(9_1^+ - 10_1^+)$ splitting in ^{44}Ti is 1.214 MeV for FPD6, but it is only 0.094 MeV for T0FPD6. In ^{47}V, the $(29/2_1^- - 31/2_1^-)$ splitting is 0.780 MeV with FPD6, in agreement with the experimental value of 0.765 MeV, but T0FPD6 yields only 0.072 MeV. In general, we observe a continuity in the splittings between the single-j and the full-fp calculations; only in two cases we see an inversion of the states. These two cases involve low angular momentum states ($1/2^-$ in ^{43}Sc and 3^+ in ^{44}Ti), for which there tends to be much more configuration mixing.

[1]A. Escuderos, B.F. Bayman, L. Zamick, and S.J.Q. Robinson, Phys. Rev. C **72**, 054301 (2005)

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