Relativistic all-order calculations of Stark-induced $6P_{1/2} - 7P1/2$ **amplitudes in thallium** W.R. JOHNSON, Notre Dame University, M.S. SAFRONOVA, University of Delaware, U.I. SAFRONOVA, T.E. COWAN, University of Nevada, Reno — Stark-induced amplitudes α and β of the $6P_{1/2} - 7P_{1/2}$ transition in Tl I are calculated in the relativistic single-double (SD) approximation, where single and double excitations of the Pb-like core are summed to all-orders in perturbation theory. Dipole matrix elements and energies for transitions from $6P_{1/2}$ and $7P_{1/2}$ states to $nS_{1/2}$ (n=7-10) and $nD_{3/2}$ (n=6-9) states are evaluated in the SD approximation and summed to give the dominant contributions to the polarizabilities. Remainders are evaluated using Dirac Fock wave functions. We obtain $\alpha = 364\, a_0^3$ and $\beta = -297\, a_0^3$ compared with measured values[1] $\alpha = 377 \pm 8\, a_0^3$ and $|\beta| = 313 \pm 8\, a_0^3$. A calculation of the Stark shift within the $6P_{1/2} - 7S_{1/2}$ transition is also carried out using SD wave functions and differs from precise measurements[1, 2] by about 5%.

[1] D. DeMille, D. Budker, and E. D. Commins, Phys. Rev. A **50**, 4657 (1994).
[2] S. C. Doret, P. D. Frieberg, A. J. Speck, D. S. Richardson, and P. K. Majumder, Phys. Rev. A **66**, 52504 (2002).

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