Optically allowed transitions among Fe IV levels belonging to lowest three configurations[1] NARAYAN C. DEB, ALAN HIBBERT, Queen's University Belfast — Oscillator strengths and transition rates for the dipole allowed transitions among $3d^5$, $3d^44s$ and $3d^44p$ levels of Fe IV are calculated with the CIV3 program of Hibbert [1]. Using Hartree-Fock functions up to 3d orbitals we have optimised 4s, 4p, 4d, 4f, 5s, 5p and 5d orbitals of which 4s and 4p are taken to be the spectroscopic and the remaining orbitals representing corrections to the spectroscopic orbitals or the correlation effects. The J-dependent levels of all 108 LS states are included in the calculation and relativistic effects are accounted for via the Breit-Pauli operator. Configurations are chosen in two steps: (a) two promotions were allowed from the 3p, 3d and 4l subshells, using all the above orbitals; (b) selective promotions from the 3s subshell are included, but only to the 3d, 4s and 4p orbitals. The *ab initio* fine-structure levels were then fine-tuned to reproduce the observed energy levels as closely as possible, and the wavefunctions used to calculate oscillator strengths for all possible E1 transitions. For many of these transitions, the present results show agreement between length and velocity forms to within 5%.

[1] A.Hibbert, Comput. Phys. Commun. **9** (1975) 141

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