The electronic states of a Kane-type semiconductor anti-wire with and without a magnetic field are theoretically investigated. The eigenvalues and eigenstates of Kane’s Hamiltonian are obtained. The calculations are performed for a hard-wall confinement potential, and electronic states are obtained as functions of the magnetic field applied along the cylinder axis. The size dependences of the effective $g$-value in InSb for electrons and light holes are calculated. The effective $g$-values of the electrons and light holes decreased with decreasing anti-wire radius.

**Key words:** Nanostructures; Spin-orbital Coupling; $g$-Factor.