Non-linear Integral Equations

An equation in which the unknown function may appear in the equation as the power of n ($n > 1$). Then the equation is called a non-linear integral equation.

(i) $y(x) = f(x) + \lambda \int_a^x K(x,t)\, y^n(t)\, dt \quad n > 1$

Volterra non-linear Integral Equation

(ii) $y(x) = f(x) + \lambda \int_a^b K(x,t)\, y^n(t)\, dt \quad n > 1$

Fredholm non-linear Integral Equation

In a more general form the unknown function can be written in the following form

(i) $y(x) = f(x) + \lambda \int_a^x g[x, t, y(t)]\, dt$

Volterra non-linear Integral Equation

(ii) $y(x) = f(x) + \lambda \int_a^b g[x, t, y(t)]\, dt$

Fredholm non-linear Integral Equation

Singular Integral Equation

An integral equation is called singular when either one or both the limits of integration becomes infinite

(i) $y(x) = f(x) + \lambda \int_0^{\infty} K(x,t)\, y(t)\, dt$

(ii) $y(x) = f(x) + \lambda \int_{-\infty}^{0} K(x,t)\, y(t)\, dt$

(iii) $y(x) = f(x) + \lambda \int_{-\infty}^{\infty} K(x,t)\, y(t)\, dt$

(iv) $y(x) = f(x) + \lambda \int_0^{\infty} \sin(xt)\, y(t)\, dt$