



4. Fredholm Integral Equations of the Second Kind

4-1. Integral equations whose kernels contain power-law functions

$$1. \quad y(x) - \lambda \int_a^b (x-t)y(t) dt = f(x).$$

$$2. \quad y(x) + A \int_a^b |x-t| y(t) dt = f(x).$$

$$3. \quad Ay(x) + \frac{B}{\pi} \int_{-1}^1 \frac{y(t) dt}{t-x} = f(x).$$

$$4. \quad y(x) - \lambda \int_0^1 \left(\frac{1}{t-x} - \frac{1}{x+t-2xt} \right) y(t) dt = f(x). \quad \text{Tricomi's equation.}$$

4-2. Integral equations whose kernels contain exponential or hyperbolic functions

$$5. \quad y(x) + \lambda \int_0^\infty e^{-|x-t|} y(t) dt = f(x).$$

$$6. \quad y(x) - \lambda \int_{-\infty}^\infty e^{-|x-t|} y(t) dt = 0. \quad \text{Lalesco-Picard equation.}$$

$$7. \quad y(x) + \lambda \int_{-\infty}^\infty e^{-|x-t|} y(t) dt = f(x).$$

$$8. \quad y(x) + A \int_a^b e^{\lambda|x-t|} y(t) dt = f(x).$$

$$9. \quad y(x) + \lambda \int_{-\infty}^\infty \frac{y(t) dt}{\cosh[b(x-t)]} = f(x).$$

4-3. Integral equations whose kernels contain trigonometric functions

$$10. \quad y(x) - \lambda \int_0^\infty \cos(xt)y(t) dt = f(x).$$

$$11. \quad y(x) - \lambda \int_0^\infty \sin(xt)y(t) dt = f(x).$$

$$12. \quad y(x) - \lambda \int_{-\infty}^\infty \frac{\sin(x-t)}{x-t} y(t) dt = f(x).$$

$$13. \quad Ay(x) - \frac{B}{2\pi} \int_0^{2\pi} \cot\left(\frac{t-x}{2}\right) y(t) dt = f(x).$$

$$14. \quad y(x) - \lambda \int_0^{\infty} e^{\mu(x-t)} \cos(xt) y(t) dt = f(x).$$

$$15. \quad y(x) - \lambda \int_0^{\infty} e^{\mu(x-t)} \sin(xt) y(t) dt = f(x).$$

4-4. Integral equations whose kernels contain arbitrary functions

$$16. \quad y(x) - \int_{-\infty}^{\infty} K(x-t) y(t) dt = f(x).$$

$$17. \quad y(x) - \int_0^{\infty} K(x-t) y(t) dt = f(x). \quad \text{Wiener-Hopf equation of the second kind.}$$

The EqWorld website presents extensive information on solutions to various classes of ordinary differential equations, partial differential equations, integral equations, functional equations, and other mathematical equations.

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