



4. Fredholm Integral Equations of the Second Kind

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

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

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

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

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

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

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

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

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

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

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

4-3. Integral equations whose kernels contain trigonometric functions

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

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

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

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

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

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

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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