

[Lyubarskij, G. Ya.](#)

On the Cauchy problem for a class of integro-differential equations on the half-line with a difference kernel. (English. Russian original) [Zbl 0859.45004](#)

[Russ. Acad. Sci., Dokl., Math. 50, No. 2, 215-219 \(1995\)](#); translation from [Dokl. Akad. Nauk, Ross. Akad. Nauk 338, No. 2, 162-164 \(1994\)](#).

We consider an equation of the form

$$P\left(i\frac{d}{dx}\right)y(x) + \int_0^\infty K(x-x')Q\left(i\frac{d}{dx'}\right)y(x')dx' = 0, \quad x > 0, \quad (1)$$

together with the initial conditions

$$i^{k+1}y^{(k)}(0) = \sigma_k, \quad k = 0, 1, \dots, m-1. \quad (2)$$

Here P and Q are polynomials, and the unknown function $y(x)$ and its derivatives of order up to m are assumed to be square-integrable on $(-\infty, \infty)$.

We pose the problem of finding all tuples $\{\sigma_\alpha\}_0^{m-1}$ for which the Cauchy problem (1), (2) is solvable, and present necessary and sufficient conditions for its solvability.

MSC:

[45J05](#) Integro-ordinary differential equations

[45E10](#) Integral equations of the convolution type (Abel, Picard, Toeplitz and Wiener-Hopf type)

Keywords:

[Wiener-Hopf method](#); [integro-differential equations on the half-line](#); [difference kernel](#); [Cauchy problem](#)