

Arendt, W.; Kellermann, H.

Integrated solutions of Volterra integrodifferential equations and applications. (English)

Zbl 0675.45017

Volterra integrodifferential equations in Banach spaces and applications, Proc. Conf., Trento/Italy 1987, Pitman Res. Notes Math. Ser. 190, 21-51 (1989).

[For the entire collection see [Zbl 0664.00018](#).]

The authors extend the concept of an integrated semigroup to the Volterra integrodifferential equation $P(A, \eta)$ $u'(t) = \int_0^t Au(t-s)d\eta(s)$, $u(0) = x$. The crucial condition for a strongly continuous family $S(t)$ of bounded linear operators to be an n -times integrated solution family of $P(a, \eta)$ is that

$$(\lambda - \hat{\eta}(\lambda)A)^{-1}/\lambda^n = \int e^{-\lambda t} S(t) dt, \quad \lambda > w.$$

A number of properties of these solution families, in particular with respect to solutions of the nonhomogeneous equation, are established.

Some necessary and sufficient conditions for the problem $P(A, \eta)$ to be governed by an integrated solution family are given. The relationship to distribution semigroups and to integrated cosine functions is discussed. Finally a number of applications are given.

Reviewer: [G.Gripenberg](#)

MSC:

[45N05](#) Abstract integral equations, integral equations in abstract spaces
[45J05](#) Integro-ordinary differential equations

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[Banach space](#); [integrated semigroup](#); [Volterra integrodifferential equation](#); [integrated solution family](#); [distribution semigroups](#); [integrated cosine functions](#)