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BOUNDED AND PERIODIC SOLUTIONS OF DIFFERENTIAL EQUATIONS WITH IMPULSE EFFECT IN A BANACH SPACE

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Abstract. Sufficient conditions are obtained for the existence of bounded and periodic solutions of linear and weakly non-linear differential equations with impulse effect in a Banach space on the axis or the semi-axis. The main results are new for equations in $\mathbf{R}^n$ as well.

1. Introduction. Differential equations with impulse effect describe the evolution of systems subject to perturbations of negligible duration. Systems with a finite number of degrees of freedom were considered in [1, 2] and a number of subsequent works by many authors.

In the present paper sufficient conditions are given for the existence of bounded and periodic solutions of linear and weakly non-linear differential equations with impulse effect in a Banach space on the axis or semi-axis. Moreover, the main results obtained are new for equations in $\mathbf{R}^n$ as well.

2. Preliminary notes. Let X be a complex Banach space, $L(X)$ be the set of all linear bounded operators $X \to X$. Consider the equation with impulse effect

$$\frac{dx}{dt} = Ax + F(t,x) + \sum_{j=-\infty}^{\infty} [Bx + H_j(x)]\delta(t - t_j). \tag{1}$$

Here δ is Dirac's delta-function; the points t_j are fixed so that

$$t_j < t_{j+1} \ (j \in \mathbf{Z}), \quad t_j \to \pm\infty \ (j \to \pm\infty);$$

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