V–MONOTONE COCYCLES AND ALMOST PERIODIC SOLUTIONS OF DIFFERENTIAL EQUATIONS

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ABSTRACT. In the present paper we consider a special class of equations $x' = f(t,x)$ when the function $f : \mathbb{R} \times E \to E$ (E is a finite-dimensional Banach space) is V–monotone with respect to (w.r.t.) $x \in E$, i.e. there exists a continuous non-negative function $V : E \times E \to \mathbb{R}_+$, which equals to zero only on the diagonal, so that the numerical function $\alpha(t) := V(x_1(t), x_2(t))$ is non-increasing w.r.t. $t \in \mathbb{R}_+$, where $x_1(t)$ and $x_2(t)$ are two arbitrary solutions of (1) defined and bounded on $\mathbb{R}_+$.

The main result of the paper contains the solution of the problem of V.V.Zhikov (1973): every finite-dimensional V-monotone almost periodic differential equation with bounded solutions admits at least one almost periodic solution.