

V -MONOTONE COCYCLES AND ALMOST PERIODIC SOLUTIONS OF DIFFERENTIAL EQUATIONS

DAVID CHEBAN AND CRISTIANA MAMMANA

ABSTRACT. In the present paper we consider a special class of equations $x' = f(t, x)$ when the function $f : \mathbb{R} \times E \rightarrow E$ (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 $V : E \times E \rightarrow \mathbb{R}_+$, 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.

Date: September 22, 2003.

1991 Mathematics Subject Classification. primary:34C35, 34D20, 34D40, 34D45, 58F10, 58F12, 58F39; secondary: 35B35, 35B40.

Key words and phrases. Non-autonomous dynamical systems, skew-product systems, cocycles, continuous invariant sections of non-autonomous dynamical systems, almost periodic and almost automorphic solutions, V -monotone dynamical systems.