

Andres, Jan; Malaguti, Luisa; Pavlačková, Martina

Strictly localized bounding functions for vector second-order boundary value problems.
(English) [Zbl 1185.34016](#)

Nonlinear Anal., Theory Methods Appl., Ser. A, Theory Methods 71, No. 12, 6019-6028 (2009).

Summary: The solvability of the second-order Floquet problem

$$\begin{aligned} \ddot{x}(t) + A(t)\dot{x}(t) + B(t)x(t) &\in F(t, x(t), \dot{x}(t)), \quad \text{a.a. } t \in [0, T], \\ x(T) &= Mx(0), \quad \dot{x}(T) = N\dot{x}(0), \end{aligned} \tag{S}$$

where

(1_i) $A, B : [0, T] \rightarrow \mathbb{R}^{n \times n}$ are measurable matrix functions such that $|A(t)| \leq a(t)$ and $|B(t)| \leq b(t)$, for all $t \in [0, T]$ and suitable integrable functions $a, b : [0, T] \rightarrow [0, \infty)$,

(1_{ii}) M and N are $n \times n$ matrices, M is nonsingular,

(1_{iii}) $F : [0, T] \times \mathbb{R}^n \times \mathbb{R}^n \circ \mathbb{R}^n$ is an upper-Carathéodory multivalued mapping

in a given set is established by means of C^2 -bounding functions for vector upper-Carathéodory systems. The applied Scorza-Dragoni type technique allows us to impose related conditions strictly on the boundaries of bound sets. An illustrating example is supplied for a dry friction problem.

MSC:

[34A60](#) Ordinary differential inclusions

[34B15](#) Nonlinear boundary value problems for ordinary differential equations

[47H04](#) Set-valued operators

Cited in **3** Documents

Keywords:

vector second-order Floquet problem; strictly localized bounding functions; solutions in a given set; Scorza-Dragoni technique; evolution systems; dry friction problem; coexistence of periodic and anti-periodic solutions

Full Text: [DOI](#)

References:

- [1] Andres, J.; Kožušníková, M.; Malaguti, L., Bound sets approach to boundary value problems for vector second-order differential inclusions, Nonlinear. anal., 71, 1-2, 28-44, (2009) · [Zbl 1177.34015](#)
- [2] Andres, J.; Kožušníková, M.; Malaguti, L., On the Floquet problem for second-order marchaud differential systems, J. math. anal. appl., 351, 360-372, (2009) · [Zbl 1166.34003](#)
- [3] Andres, J.; Malaguti, L.; Taddei, V., A bounding functions approach to multivalued boundary value problems, Dynam. systems appl., 16, 37-48, (2007) · [Zbl 1126.34010](#)
- [4] Andres, J.; Malaguti, L.; Taddei, V., Bounded solutions of Carathéodory differential inclusions: A bound sets approach, Abstr. appl. anal., 9, 547-571, (2003) · [Zbl 1036.34011](#)
- [5] Andres, J.; Malaguti, L.; Taddei, V., Floquet boundary value problems for differential inclusions: A bound sets approach, Z. anal. anwend., 20, 3, 709-725, (2001) · [Zbl 0986.34012](#)
- [6] Andres, J.; Malaguti, L.; Taddei, V., On boundary value problems in Banach spaces, Dynam. systems appl., 18, 275-302, (2009) · [Zbl 1195.34091](#)
- [7] I. Benedetti, E. Panasenko, V. Taddei, Sharp conditions for Carathéodory inclusions in Hilbert spaces (submitted for publication) · [Zbl 1276.34013](#)
- [8] Andres, J.; Górniewicz, L., ()
- [9] Mawhin, J.; Thompson, H.B., Periodic or bounded solutions of Carathéodory systems of ordinary differential equations, J. dynam. differential equations, 15, 2-3, 327-334, (2003) · [Zbl 1055.34035](#)
- [10] Kožušníková, M., A bounding functions approach to multivalued Dirichlet problem, Atti semin. mat. fis. univ. modena reggio emilia, 55, 1-19, (2007)

- [11] Taddei, V., Two-points boundary value problems for Carathéodory second order equations, Arch. math. (Brno), 44, 2, 93-103, (2008) · [Zbl 1212.34039](#)
- [12] Taddei, V.; Zanolin, F., Bound sets and two-point boundary value problems for second order differential equations, Georgian math. J., 14, 2, 385-402, (2007), (special issue dedicated to 70th birthday of Prof. I. Kiguradze) · [Zbl 1133.34013](#)
- [13] Aubin, J.-P.; Cellina, A., Differential inclusions, (1984), Springer Berlin
- [14] Górniewicz, L., Topological fixed point theory of multivalued mappings, (2006), Springer Berlin · [Zbl 1107.55001](#)
- [15] Hu, S.; Papageorgiou, N.S., Handbook of multivalued analysis, vol. I: theory, (1997), Kluwer Dordrecht · [Zbl 0887.47001](#)
- [16] Deimling, K., Multivalued differential equations, (1992), Walter de Gruyter Berlin · [Zbl 0760.34002](#)
- [17] Daleckiĩ, Ju.L.; Kreĩn, M.G., ()
- [18] Augustynowicz, A.; Dzedzej, Z.; Gelman, B.D., The solution set to BVP for some functional differential inclusions, Set-valued anal., 6, 257-263, (1998) · [Zbl 0931.34046](#)
- [19] Kurzweil, J., Ordinary differential equations, (1986), Elsevier & SNTL Dordrecht & Prag · [Zbl 0619.26006](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.