Differential
Equations
& Applications
Volume 2, Number 3 (2010), 331–343

QUASI–PERIODIC SOLUTIONS OF NONLINEAR DIFFERENTIAL EQUATIONS VIA THE FLOQUET–LIN THEORY

J. BEN SLIMENE AND J. BLOT

Abstract. We use a Floquet theory for quasi-periodic linear ordinary differential equations due to Zhensheng Lin to obtain results on the quasi-periodic solutions of quasi-periodic nonlinear ordinary differential equations. First we obtain an existence result, secondly we obtain a result on the continuous dependence by using a parametrized fixed point theorem, and thirdly we obtain a local result on the differentiable dependence by using an implicit function theorem in function spaces.

Mathematics subject classification (2010): 34C27, 34C15, 34D08.
Keywords and phrases: quasi-periodic solutions, Floquet theory, fixed-point theorem, implicit function theorem.

REFERENCES

[1] J. BLOT, P. CIEUTAT AND J. MAWHIN, *Almost periodic oscillations of monotone second order systems*, Adv. Differential Equations, **2**, 5 (1997), 693–714.
[2] J. BLOT, P. CIEUTAT, G.M. N'GUÉRÉKATA AND D. PENNEQUIN, *Superposition operators between various almost periodic function spaces and applications*, Commun. Math. Anal., **6**, 1 (2009), 12–70.
[3] J. BLOT AND D. PENNEQUIN, *Spaces of Quasi-Periodic Functions and Oscillations in Differential Equations*, Acta Appl. Math., **65** (2001), 83–113.
[4] H. CARTAN, *Cours de calcul différentiel*, Hermann, Paris, 1967.
[5] C. CORDUNEANU, *Almost Periodic Functions*, Second English Edition, Chelsea, New York 1989.
[6] A. M. FINK, *Almost Periodic Differential Equations*, Lect. Notes Math. 377, Springer-Verlag, Berlin, 1974.
[7] G. M. N'GUÉRÉKATA, *Topics in almost automorphy*, Springer, New York, 2005.
[8] Z. LIN, *The Floquet theory for quasi-periodic linear systems*, Appl. Math. Mech., Eng. Ed. 3, (1982), 365–381.
[9] Z. LIN, *Theory of linear systems*, Ann. Differ. Eq., **6**, 2 (1990), 153–215.
[10] Z. LIN AND Y. X. LIN, *Linear Systems, Exponential Dichotomy, and Structure of Sets of Hyperbolic Points*, World Scientific, Singapore, 2000.
[11] M. ROSEAU, *Vibrations non linéaires et théorie de la stabilité*, Springer-Verlag, Berlin, 1966.
[12] A. M. SAMOILENKO, *Elements of the Mathematical Theory of Multi-Frequency Oscillations*, English Edition, Kluwer Academic Publishers, Dordrecht, 1991.
[13] T. YOSHIZAWA, *Stability Theory and the Existence of Periodic Solutions and Almost Periodic Solutions*, Springer-Verlag, New York, 1975.
[14] L. SCHWARTZ, *Cours d'analyse, tome 1*, Hermann, Paris, 1981.

Paper DEA-02-22