

ON SOME EQUATIONS $y'(x) = f(x, y(h(x) + g(y(x))))$

ZBIGNIEW GRANDE

Institute of Mathematics
Kazimierz Wielki University
Plac Weyssenhoffa 11, 85-072 Bydgoszcz, Poland
e-mail: grande@ukw.edu.pl

Abstract

In [4] W. Li and S.S. Cheng prove a Picard type existence and uniqueness theorem for iterative differential equations of the form $y'(x) = f(x, y(h(x) + g(y(x))))$. In this article I show some analogue of this result for a larger class of functions f (also discontinuous), in which a unique differentiable solution of considered Cauchy's problem is obtained.

Keywords: iterative differential equation, existence and uniqueness theorem, Picard approximation, derivative, (S)-continuity, (S)-path continuity.

2010 Mathematics Subject Classification: 34A12, 39B12, 26B05.

REFERENCES

- [1] A.M. Bruckner, *Differentiation of real functions*, Lectures Notes in Math. 659, Springer-Verlag, Berlin, 1978.
- [2] Z. Grande, *A theorem about Carathéodory's superposition*, Math. Slovaca **42** (1992), 443–449.
- [3] Z. Grande, *When derivatives of solutions of Cauchy's problem are (S)-continuous?*, Tatra Mt. Math. Publ. **34** (2006), 173–177.
- [4] W. Li and S.S. Cheng, *A Picard theorem for iterative differential equations*, Demonstratio Math. **42** (2) 2009, 371–380.
- [5] B.S. Thomson, *Real Functions*, Lectures Notes in Math., Vol. 1170, Springer-Verlag, Berlin, 1980.

Received 17 January 2011