

ITERATION GROUPS, ALGEBRA AND DIFFERENTIAL EQUATIONS

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The theory of functional equations offers powerful methods and results for solving problems in the theory of differential equations, and conversely, some questions concerning global behavior of solutions of differential equations initiated intensive and far-reaching investigations of functional equations. As an example let me mention the transformation theory of differential equations (with or without deviating arguments) that led to seeking simultaneous solutions of a system of Abel equations, in other words, for finding sufficient and/or necessary conditions for embedding bijections $\xi : I \xrightarrow{\text{onto}} I$, $i = 1, \dots, k$, into a disjoint iteration group of homeomorphisms on I , [3]. Since then an intensive research was carried out by J.A. Baker, G. Blanton [1], J. Čermák [2], J. Tabor, M.C. Zdun [5, 6] and others. It is also interesting, how algebraic tools, namely methods and results of ordered abelian groups, can elegantly produce a sufficient and necessary condition in the case of transformations of linear differential equations of arbitrary orders, [4], without tedious analytic computations normally used in such situations.

References

- [1] G. Blanton and J.A. Baker, Iteration groups generated by C^n functions, *Arch. Math. (Brno)* **19** (1982), 121–127.
- [2] J. Čermák, Note on simultaneous solutions of a system of Schöder equations, *Math. Bohemica*, submitted.
- [3] F. Neuman, Simultaneous solutions of Abel equations and differential equations with several deviations, *Czechoslovak Math. J.* **32** (107) (1982), 448–494.
- [4] F. Neuman, Ordered groups, commuting matrices and iterations of functions in transformations of differential equations, in: *Constantin Carathéodory – An International Tribute*, Vol. II, World Scientific Publ. Co., Singapore, 1991, 945–955.
- [5] M.C. Zdun, On simultaneous Abel equations, *Aequationes Math.* **38** (1989), 163–177.
- [6] M.C. Zdun, The structure of iteration groups of continuous functions, *Aequationes Math.* **46** (1993), 19–37.