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AFFINE-PERIODIC SOLUTIONS FOR GENERALIZED ODES AND OTHER EQUATIONS

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Abstract. It is known that the concept of affine-periodicity encompasses classic notions of symmetries as the classic periodicity, anti-periodicity and rotating symmetries (in particular, quasi-periodicity). The aim of this paper is to establish the basis of affine-periodic solutions of generalized ODEs. Thus, for a given real number $T > 0$ and an invertible $n \times n$ matrix Q, with entries in $\mathbb{C}$, we establish conditions for the existence of a (Q, T)-affine-periodic solution within the framework of nonautonomous generalized ODEs, whose integral form displays the nonabsolute Kurzweil integral, which encompasses many types of integrals, such as the Riemann, the Lebesgue integral, among others. The main tools employed here are the fixed point theorems of Banach and of Krasnosel'skiĭ. We apply our main results to measure differential equations with Henstock–Kurzweil–Stiejtes righthand sides as well as to impulsive differential equations and dynamic equations on time scales which are particular cases of the former.

1. Introduction

Many processes which appear in nature can be described by mathematical models which involve periodic, anti-periodic or quasi-periodic functions. It is well-known, for instance, that several applications of the classical Hamiltonian perturbation theory require the study of periodic and quasi-periodic motions

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