



Formal Trigonometric Series, Almost Periodicity and Oscillatory Functions

C. Corduneanu

University of Texas, Arlington and The Romanian Academy

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Abstract: This paper is the second, in a cycle dedicated to the new approach in constructing new oscillatory functions spaces, taking as primary object the formal trigonometric series and their generalizations, whose terms are of the form $\exp if(t)$, with $f(t)$ functions that belong to various classes. The linear case being considered in the first part of the paper leads to the classical cases of periodicity and almost periodicity, while the generalized case is aimed to obtain more general spaces of oscillatory functions, including those already known, due to V.F. Osipov and Ch. Zhang.

Keywords: *almost periodicity; formal trigonometric series; oscillatory functions spaces.*

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1 Introduction

The periodic and, more general, the oscillatory functions/motions appeared in Science and Engineering and other fields of knowledge, have conducted to the development of classical Fourier Analysis of periodic functions and their associated series. While the first traces of this branch of classical analysis can be found in the Mathematics of the XVIII-th century (Euler, for instance), it is the XIX-th century that contains significant results, which stimulated substantially the birth of new theories, contributing vigorously to the new concepts of Modern Analysis (Set Theory, Real variables including Measure and Integral). The Fourier Analysis, as developed until the third decade of the XX-th century, has known a strong impulse due to the emerging of the concept of Almost Periodicity, due to H. Bohr (1923-25), and successfully continued to the present day.

* Corresponding author: <mailto:corduneanu0726@gmail.com>