

## ON THE $S$ -ASYMPTOTICALLY $\omega$ -PERIODIC MILD SOLUTIONS FOR MULTI-TERM TIME FRACTIONAL MEASURE DIFFERENTIAL EQUATIONS

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**ABSTRACT.** In this paper, based on regulated functions and fixed point theorem, a class of nonlocal problem of multi-term time-fractional measure differential equations involving nonlocal conditions in Banach spaces. Firstly, we introduce the concept of  $S$ -asymptotically  $\omega$ -periodic mild solution, on the premise of by utilizing  $(\beta, \gamma_k)$ -resolvent family and measure functional (Henstock–Lebesgue–Stieltjes integral), the existence of  $S$ -asymptotically  $\omega$  periodic mild solutions for the mentioned system are obtained. Finally, as the application of abstract results, the existence  $S$ -asymptotically  $\omega$ -periodic mild solution for a classes of measure driven differential equation are discussed.

### 1. Introduction

Fractional calculus has attracted extensive attention from many scholars in different fields, such as, mathematicians, physicists, and so on. Compared with integer-order calculus, fractional-order calculus can accurately describe the memory or genetic characteristics of various new materials, or better describe the process or behavior of real dynamic systems. Hence, fractional evolution equations have been studied by many authors, and the results on the existence

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*Key words and phrases.* Regulated functions; Henstock–Lebesgue–Stieltjes integral; fractional calculus; semigroup theory; multi-term time-fractional; fixed point theory.

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