



A Study on Tempered Fractional Calculus Involving the Multivariate Mittag-Leffler Function

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Abstract

In this paper we develop a framework for tempered fractional calculus [1] associated with the multivariate Mittag-Leffler function [2]. We start by introducing the tempered integral operator with a multivariate Mittag-Leffler kernel. Then, the fundamental properties of this operator including boundedness on $L^1(a, b)$, infinite-series representations, Laplace transform formulas, semigroup properties and the construction of a left-inverse fractional derivative operator are derived. Several examples involving power functions and generalized Mittag-Leffler functions are demonstrated.

Keywords: Multivariate Mittag-Leffler function, tempered fractional calculus, Laplace operator.

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