(103)

Communications in Mathematics and Applications
Vol. 13, No. 3, pp. 1003–1012, 2022
ISSN 0975-8607 (online); 0976-5905 (print)
Published by RGN Publications
DOI: 10.26713/cma.v13i3.1830

Research Article

A New Integral Transform With Applications to Fractional Calculus

S. M. Chinchole

Department of Mathematics, Mahatma Gandhi Vidyamandir's Arts, Science and Commerce College, Manmad, India
mr.sanjaymaths@gmail.com

Received: February 27, 2022 **Accepted:** July 7, 2022

Abstract. In this paper, an integral transform with the kernel being the Mittag-Leffler function in two parameters is introduced. Some properties of this integral transform are discussed. Also, its formulae for derivatives of the function are derived. The new integral transform is applied to derive the exact formula for the Laplace transform of fractional derivatives.

Keywords. Mittag-Leffler function, Integral transform, Laplace transform, Fractional derivative

Mathematics Subject Classification (2020). 26A33, 33E12, 44A10, 44A05

1. Introduction

For almost two centuries, integral transformations have been effectively used in solving many problems in applied mathematics, mathematical physics, and engineering science. The concept of integral transform originates from the famous Fourier integral formula. The significance of integral transforms is that they accommodate important operational methods for solving initial value problems and initial-boundary value problems for linear differential and integral equations. The study of differential and integral equations occurring in applied mathematics, mathematical physics, and engineering was the main incentive for the development of the operational calculus of integral transforms. The operational calculus of integral transforms is also applied to difference equations, integral equations, fractional derivatives, and fractional