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Fractional Integral Transformations of Mittag-Leffler Type *E*-function

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Abstract : This paper deals with various fractional integral transformations of Mittag-Leffler type *E*-function and obtain results for earlier defined Mittag-Leffler type functions.

Keywords : Mittag-Leffler type functions, Fractional integral transformations.

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1. Introduction

By recent works of several authors, it has proved that Mittag-Leffler (M-L) function is the solution of fractional differential and integral equations. Many authors have denned various generalizations of M-L function. In an effort to unify results of various forms of M-L function we have defined a unified M-L type function named S-function [1]. Here we study Erdélyi-Kober, Riemann-Liouville and other fractional integral transformation of newly defined M-L type *E*-function.

Throughout this paper, we use the following definitions

- Riemann-Liouville fractional integral operator $\left(I_{c+}^{\theta}\Psi\right)(x)$ [5]

$$\left(I_{c+}^{\theta}\Psi\right)(x)=\frac{1}{\Gamma(\theta)}\int_{c}^{x}(x-t)^{\theta-1}\Psi(t)\,dt \tag{1}$$

where $\theta\in\mathbb{C}\,and\,\Re(\theta)>0$.

- Erdélyi-Kober fractional integral operator $\left(\Xi_{0+}^{\eta,\theta}f\right)(x)$ [5]

$$\left(\Xi_{0+}^{\eta,\theta}f\right)(x)=\frac{x^{-\eta-\theta}}{\Gamma(\eta)}\int_{0}^{x}(x-t)^{\eta-1}t^{\theta}f(t)\,dt \tag{2}$$

where $\eta,\theta\in\mathbb{C};\Re(\eta)>0\,and\,\Re(\theta)>0$.

- In 1903, Gösta Mittag-Leffler [4], introduced the function $E_{\alpha}(z)$, defined as

$$E_{\alpha}(z)=\sum_{n=0}^{\infty}\frac{1}{\Gamma(\alpha n+1)}z^{n} \tag{3}$$

where $z,\alpha\in\mathbb{C};\Re(\alpha)\geq 0\,and\,|z|<\infty$.