South East Asian J. of Mathematics and Mathematical Sciences
Vol. 16, No. 3 (2020), pp. 83-96

ISSN (Online): 2582-0850

ISSN (Print): 0972-7752

HYPERGEOMETRIC FORMS OF SOME COMPOSITE FUNCTIONS CONTAINING ARCCOSINE(x) USING MACLAURIN'S EXPANSION

M. I. Qureshi, Javid Majid and Aarif Hussain Bhat

Department of Applied Sciences and Humanities,
Faculty of Engineering and Technology,
Jamia Millia Islamia (A Central University), New Delhi-110025, INDIA

E-mail : miqureshi_delhi@yahoo.co.in, javidmajid375@gmail.com,
aarifsaleem19@gmail.com

(**Received:** *Feb. 25, 2020* **Accepted:** *Sep. 09, 2020* **Published:** *Dec. 30, 2020)*

Abstract: In this article, we have derived the hypergeometric forms of some composite functions containing, arccosine(x) and arccosh(x) like: $\exp(b\cos^{-1}x)$, $\frac{\exp(b\cos^{-1}x)}{\sqrt{(1-x^2)}}$, $\frac{\cos^{-1}x}{\sqrt{(1-x^2)}}$, $\frac{\sin\ (b\cos^{-1}x)}{\sqrt{(1-x^2)}}$, $\exp(a\cosh^{-1}x)$, $\frac{\exp(a\cosh^{-1}x)}{\sqrt{(x^2-1)}}$, $\frac{\cosh^{-1}x}{\sqrt{(x^2-1)}}$ and $\frac{\sin\ (a\cosh^{-1}x)}{\sqrt{(x^2-1)}}$ by using the Leibniz theorem for successive differentiation, the Maclaurin's series expansion, the Taylor's series expansion and the Euler's linear transformation, as the proof of the hypergeometric forms of the above functions is not available in the literature. Some applications of the functions are also obtained in the form of the Chebyshev polynomials and the Chebyshev functions.

Keywords and Phrases: The Gauss' Hypergeometric function, The Maclaurin's series expansion, The Taylor's series expansion, The Leibniz theorem, The Chebyshev polynomials, The Euler's linear transformation.

2010 Mathematics Subject Classification: 33C05, 34A35, 41A58, 33B10.

1. Introduction and Preliminaries

In this paper, we shall use the following standard notations:
$\mathbb{N} := \{1,2,3,\cdots\}\,;\mathbb{N}_0 := \mathbb{N}\bigcup\{0\}\,;\mathbb{Z}_0^- := \mathbb{Z}^-\bigcup\{0\} = \{0,-1,-2,-3,\cdots\}\,.$
The symbols $\mathbb{C}$, $\mathbb{R}$, $\mathbb{N}$, $\mathbb{Z}$, $\mathbb{R}^+$ and $\mathbb{R}^-$ denote the sets of complex numbers, real