

Contents

1 Preliminaries	1
1.1 Continuous and Absolutely Continuous Functions	1
1.2 The Gamma and Beta Functions	3
1.3 Convex Functions and Classes of Convexity	5
1.4 Fractional Calculus	13
1.4.1 The Riemann-Liouville Fractional Integrals and Derivatives	13
2 An Extended Generalized Mittag-Leffler Function	17
2.1 A Further Extension of the Mittag-Leffler Function	18
2.2 Fractional Integral Operators Associated with the Mittag-Leffler Function	22
2.3 Unified Integral Operators	26
3 Opial Type Fractional Integral Inequalities Associated with the Mittag-Leffler Function	29
3.1 Opial Type Fractional Integral Inequalities and an Extended Generalized Mittag-Leffler Function	31
3.2 Properties of Associated Fractional Linear Functional	35
4 Pólya-Szegő and Chebyshev Types Fractional Integral Inequalities Associated with the Mittag-Leffler Function	37
4.1 Pólya-Szegő Type Fractional Integral Inequalities and an Extended Generalized Mittag-Leffler Function	38
4.2 Chebyshev Type Fractional Integral Inequalities and an Extended Generalized Mittag-Leffler Function	42

5 Minkowski Type Fractional Integral Inequalities Associated with the Mittag-Leffler Function	49
5.1 Reverse Minkowski Type Inequalities Involving an Extended Generalized Mittag-Leffler Function	50
5.2 Related Minkowski Type Inequalities	52
5.3 Further Generalizations of Minkowski Type Inequalities	56
6 Classical Integral Inequalities and the Mittag-Leffler Function	63
6.1 Generalizations of Classical Integral Inequalities Involving an Extended Generalized Mittag-Leffler Function	64
6.2 Extensions of Classical Integral Inequalities Involving an Extended Generalized Mittag-Leffler Function	69
6.3 Further Generalizations of Some Classical Integral Inequalities	74
7 Hadamard and Fejér-Hadamard Types Fractional Integral Inequalities Associated with the Mittag-Leffler Function	81
7.1 Hadamard and Fejér-Hadamard Inequalities for Convex Functions	81
7.2 Hadamard and Fejér-Hadamard Inequalities for Relative Convex Functions	90
7.3 Hadamard and Fejér-Hadamard Inequalities for m -convex Functions	93
7.4 Hadamard and Fejér-Hadamard Inequalities for $(h-m)$ -convex Functions	100
7.5 Hadamard and Fejér-Hadamard inequalities for Harmonically Convex Functions	104
7.6 Hadamard and Fejér-Hadamard Inequalities for Harmonically $(\alpha, h-m)$ -convex Functions	122
7.6.1 Results for Harmonically $(h-m)$ -convex Functions	129
7.6.2 Results for Harmonically (α, m) -convex Functions	131
8 Error Bounds of Hadamard and Fejér-Hadamard Inequalities and Bounds of Fractional Integral Operators Associated with Mittag-Leffler Function	133
8.1 Error Bounds Associated with Fractional Integral Inequalities for Convex Functions	134
8.2 Error Bounds Associated with Fractional Integral Inequalities for m -convex Functions	143
8.3 Bounds of Fractional Integral Operators for $(h-m)$ -convex Functions	154
8.4 Inequalities for the Extended Generalized Mittag-Leffler Function	160

8.5	Error Bounds of Fractional Integral Operators for Quasi-convex Functions	163
8.5.1	Recurrence Inequalities for Mittag-Leffler Functions	164
8.5.2	Error Bounds of Hadamard and Fejér-Hadamard Inequalities . . .	167
8.6	Bounds of Fractional Integral Operators for s -convex Functions	172
8.7	Bounds of Fractional Integral Inequalities for (s,m) -convex Functions . .	178
8.8	Bounds of Fractional Integral Operators for Exponentially s -convex Functions	185
8.9	Bounds of Fractional Integral Operators for Strongly (s,m) -convex Functions	192
8.10	Bounds of Fractional Integral Operators for Exponentially (s,m) -convex Functions	204
8.11	Bounds of Fractional Integral Operators for Exponentially m -convex Functions	210
9	Bounds of Unified Integral Operators Containing Mittag-Leffler Function	225
9.1	Bounds of Unified Integral Operators of Convex Functions	225
9.2	Bounds of Unified Integral Operators for Exponentially (s,m) -Convex Functions	234
9.3	Bounds of Unified Integral Operators for Strongly (s,m) -Convex Functions	245
9.4	Bounds of Unified Integral Operators for (α,m) -Convex Functions . . .	253
Bibliography		261
Index		271