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Fractional Euler-Maclaurin-Type Inequalities for Exponentially Convex Functions

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Abstract

This paper presents a rigorous investigation into the application of exponentially convex functions within the framework of fractional calculus, focusing on a lemma obtained through the Riemann-Liouville fractional integral operator. By exploiting the intrinsic properties of exponentially convex functions, we extend and generalise fractional inequalities of the EulerMaclaurin type. Our results yield sharper bounds and new insights into the structural composition of these inequalities, demonstrating their use in improving classical inequalities in the fractional context. This work contributes to the broader mathematical discourse by enhancing the theoretical understanding of fractional integral operators and their interplay with exponentially convex functions, paving the way for further developments in the field.

Keywords: Euler-Maclaurin Type Inequalites, Convex Functions, Exponentially Convex Functions, Fractional Integrals.