



Two-sided inequalities for the Struve and Lommel functions

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Abstract:

Mathematical inequalities and other results involving such widely- and extensively-studied special functions of mathematical physics and applied mathematics as (for example) the Bessel, Struve and Lommel functions as well as the associated hypergeometric functions are potentially useful in many seemingly diverse areas of applications, especially in situations in which these functions are involved in solutions of mathematical, physical and engineering problems which can be modeled by ordinary and partial differential equations. With this objective in view, our present investigation is motivated by some open problems involving inequalities for a number of particular forms of the hypergeometric function ${}_1F_2(a; b, c; z)$. Here, in this paper, we apply a novel approach to such problems and obtain presumably new two-sided inequalities for the Struve function, the associated Struve function and the modified Struve function by first investigating inequalities for the general hypergeometric function ${}_1F_2(a; b, c; z)$. We also briefly discuss the analogous new inequalities for the Lommel function under some conditions and constraints. Finally, as special cases of our main results, we deduce several inequalities for the modified Lommel function and the normalized Lommel function.

Keywords:

Generalized hypergeometric function ${}_pF_q$, gamma function, Pochhammer symbol, gamma function, Mellin-Barnes contour integral, confluent hypergeometric functions, Struve functions, associated and modified Struve functions, Lommel functions, modified and normalized Lommel functions.

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