

## **Uniform asymptotic expansions for Lommel and related functions.**

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Lommel functions and are generalizations of the Struve functions and Anger functions. These families of functions occur in fluid dynamics, aerodynamics, magnetohydrodynamics, optical diffraction, and particle quantum dynamics. They can be expressed explicitly in terms of integrals, as well as hypergeometric functions. Lommel functions are solutions of homogeneous third order linear differential equations, as well as inhomogeneous Bessel differential equations. Using a differential equation approach we rigorously obtain uniform asymptotic expansions for Lommel and Anger functions in terms of Scorer functions (which are solutions of the inhomogeneous Airy equation). An interesting complication is the identification of the Lommel functions with the new asymptotic solutions, and we need to consider certain sectors of the complex plane, as well as introduce new forms of these functions, in order to do so.