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Estimation of higher-order derivatives of flat functions and its application. (Chinese. English summary) Zbl 07404469
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Summary: In this paper, we investigate the sup-norm of \(n\)-th derivative for any flat function. Based on the ideas of functional analysis, using some basic knowledge of mathematical analysis, we prove that the asymptotic growth of sup-norms is faster than \(n!\). As an application of this result, we give a new proof of the analyticity of completely monotonic functions. In the end of this paper, we also show that our asymptotic estimation is optimal in some sense.

MSC:
26A24 Differentiation (real functions of one variable): general theory, generalized derivatives, mean value theorems
26A48 Monotonic functions, generalizations

Keywords:
flat function; higher-order derivatives; completely monotonic function; analyticity