

# On the convergence of the method for indefinite integration of oscillatory and singular functions

Paweł Keller\*, Paweł Woźny

*Institute of Computer Science, University of Wrocław, ul. Joliot-Curie 15, 50-383 Wrocław, Poland*

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## Abstract

We consider the problem of convergence and error estimation of the method for computing indefinite integrals proposed in [P. Keller, *A method for indefinite integration of oscillatory and singular functions*, Numerical Algorithms **46**(3) (2007), 219–251]. To this end, we have analysed the properties of the difference operator related to the difference equation for the Chebyshev coefficients of a function that satisfies a given linear differential equation with polynomial coefficients. Properties of this operator were never investigated before. The obtained results lead us to the conclusion that the studied method is always convergent. We also give a rigorous proof of the error estimates.

*Key words:* indefinite integration, oscillatory function, singular function, Chebyshev polynomials, linear difference operator, linear difference equation

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\*Corresponding author. Fax: +48 71 3757801.

*Email addresses:* [Pawel.Keller@ii.uni.wroc.pl](mailto:Pawel.Keller@ii.uni.wroc.pl) (Paweł Keller), [Pawel.Wozny@ii.uni.wroc.pl](mailto:Pawel.Wozny@ii.uni.wroc.pl) (Paweł Woźny)

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