

ANALYSIS OF THE CONVERGENCE FEATURES OF THE δ
TRANSFORMATION FOR A CLASS OF FACTORIALLY
DIVERGING ASYMPTOTIC SERIES

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An analysis of the convergence features of the sequence obtained by applying the δ transformation [1, Eq. (8.4-4)] on the partial sums of the following class of asymptotic series:

$$\sum_{k=0}^{\infty} (-1)^k z^k \Gamma(k + q + 1),$$

is presented. In particular, on using the inverse factorial representation of the converging factor of the series found in Ref. [2, Eq. (52)], together with the recently reviewed treatment of factorial series [3], an asymptotic analysis of the convergence speed of the transformation, in the limit of large values of the transformation order, is provided for $z > 0$ and $q \in (-1, 1)$.

References

- [1] E. J. Weniger, *Nonlinear sequence transformations for the acceleration of convergence and the summation of divergent series*, Comp. Phys. Rep., 10 (1989), pp. 189 – 371.
- [2] R. Borghi, *Asymptotic and factorial expansions of Euler series truncation errors via exponential polynomials*, Appl. Num. Math., 60 (2010), pp. 1242 – 1250.
- [3] E. J. Weniger, *Summation of divergent power series by means of factorial series*, Appl. Num. Math., 60 (2010), pp. 1429 – 1441.