

## ON A GENERAL INEQUALITY RELATED TO THE GENERALIZED–EULER–CONSTANT FUNCTION

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*Abstract.* Let  $\gamma(z)$  be the generalized-Euler-constant function. In this paper, we establish a general inequality related to  $\gamma(z)$ , which contains a result due to Chen and Han as a special case. We also obtain an inequality for the generalized Somos recurrence constant, using its relation with the generalized-Euler-constant function.

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### REFERENCES

- [1] C.P. CHEN, *New asymptotic expansions related to Somos' quadratic recurrence constant*, C. R. Acad. Sci. Paris, Ser. I. 351(2013), 9–12.
- [2] C.P. CHEN, X.F. HAN, *On Somos' quadratic recurrence constant*, J. Number Theory 166(2016), 31–40.
- [3] S.R. FINCH, *Mathematical Constants*, Cambridge University Press, Cambridge, England, 2003.
- [4] J. GUILLERA, J. SONDOW, *Double integrals and infinite products for some classical constants via analytic continuations of Lerch's transcendent*, Ramanujan J. 16(2008), 247–270.
- [5] M.D. HIRSCHHORN, *A note on Somos' quadratic recurrence constant*, J. Number Theory 131(2011), 2061–2063.
- [6] V. LAMPRET, *Approximation of Sondow's generalized-Euler-constant function on the interval  $[-1, 1]$* , Ann. Univ. Ferrara 56(2010), 65–76.
- [7] D. LU, Z. SONG, *Some new continued fraction estimates of the Somos' quadratic recurrence constant*, J. Number Theory 155(2015), 36–45.
- [8] X.S. MA, C.P. CHEN, *Inequalities and asymptotic expansions related to the generalized Somos quadratic recurrence constant*, J. Inequal. Appl. 2018(2018), Article 147.
- [9] C. MORTICI, *Estimating the Somos' quadratic recurrence constant*, J. Number Theory 130(2010), 2650–2657.
- [10] G. NEMES, *On the coefficients of an asymptotic expansion related to Somos' quadratic recurrence constant*, Appl. Anal. Discrete Math. 5(2011), 60–66.
- [11] K.H. PILEHROOD, T.H. PILEHROOD, *Arithmetical properties of some series with logarithmic coefficients*, Math. Z. 255(2007), 117–131.
- [12] K.H. PILEHROOD, T.H. PILEHROOD, *Vacca-type series for values of the generalized Euler constant function and its derivative*, J. Integer Seq. 13(2010), Article ID 10.7.3.
- [13] S. RAMANUJAN, G.H. Hardy, P.V.S. Aiyar, B.M. Wilson (eds.), *Collected Papers of Srinivasa Ramanujan*, Amer. Math. Soc. Providence, 2000.
- [14] M. SOMOS, *Several constants related to quadratic recurrences*, unpublished note, 1999.
- [15] J. SONDOW, *Double integrals for Euler's constant and  $\ln(4/\pi)$  and an analog of Hadjicostas's formula*, Amer. Math. Monthly, 112(2005), 61–65.
- [16] J. SONDOW, *New Vacca-type rational series for Euler's constant and its "alternating" analog in  $\ln(4/\pi)$* , In: Additive Number Theory, pp. 331–340, Springer, New York, 2010.
- [17] J. SONDOW, P. HADJICOSTAS, *The generalized-Euler-constant function  $\gamma(z)$  and a generalization of Somos' quadratic recurrence constant*, J. Math. Anal. Appl. 332(2007), 292–314.

- [18] E.W. WEISSTEIN, *Somos's quadratic recurrence constant*, MathWorld-A Wolfram Web Resource, Published electronically at <http://mathworld.wolfram.com/SomossQuadraticRecurrenceConstant.html>.
- [19] A. XU, *Asymptotic expansion related to the generalized Somos recurrence constant*, Int. J. Number Theory, 15(2019), 2043–2055.
- [20] X. YOU, D.R. CHEN, *Improved continued fraction sequence convergent to the Somos' quadratic recurrence constant*, J. Math. Anal. Appl. 436(2016), 513–520.