

WILKER AND HUYGENS TYPE INEQUALITIES FOR THE LEMNISCATE FUNCTIONS

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Abstract. In this paper, we establish Wilker and Huygens type inequalities for the Lemniscate functions.

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REFERENCES

- A. BARICZ AND J. SÁNDOR, Extensions of generalized Wilker inequality to Bessel functions, J. Math. Inequal. 2 (2008), 397–406.
- [2] J. M. BORWEIN AND P. B. BORWEIN, Pi and the AGM: a study in the analytic number theory and computational complexity, John Wiley and Sons, New York, 1987.
- [3] B. C. CARLSON, Algorithms involving arithmetic and geometric means, Amer. Math. Monthly, 78 (1971) 496–505.
- [4] B. C. CARLSON, Special functions of applied mathematics, Academic Press, New York, 1977.
- [5] C.-P. CHEN AND W.-S. CHEUNG, Wilker- and Huygens-type inequalities and solution to Oppenheim's problem, Integral Transforms Spec. Funct. 23 (2012), 325–336.
- [6] B.-N. Guo, B.-M. QIAO, F. QI AND W. LI, On new proofs of Wilker inequalities involving trigonometric functions, Math. Inequal. Appl. 6 (2003), 19–22.
- [7] C. HUYGENS, Oeuvres Completes 1888-1940, Société Hollondaise des Science, Haga.
- [8] D. S. MITRINOVIĆ, Analytic Inequalities, Springer-Verlag, Berlin, 1970.
- [9] C. MORTICI, The natural approach of Wilker-Cusa-Huygens inequalities, Math. Inequal. Appl. 14 (2011), 535–541.
- [10] E. NEUMAN, On Gauss lemniscate functions and lemniscatic mean, Math. Pannon, 18 (2007), 77–94.
- [11] E. NEUMAN, Two-sided inequalities for the lemniscate functions, J. Inequal. Spec. Funct. 1 (2010), 1–7.
- [12] E. NEUMAN, One- and two-sided inequalities for Jacobian elliptic functions and related results, Integral Transforms Spec. Funct. 21 (2010), 399–407.
- [13] E. NEUMAN AND J. SÁNDOR, On some inequalities involving trigonometric and hyperbolic functions with emphasis on the Cusa-Huygens, Wilker, and Huygens inequalities, Math. Inequal. Appl. 13 (2010), 715–723.
- [14] E. NEUMAN, On Wilker and Huygens type inequalities, Math. Inequal. Appl. 15 (2012), 271–279.
- [15] I. PINELIS, L'Hospital rules of monotonicity and Wilker-Anglesio inequality, Amer. Math. Monthly, 111 (2004), 905–909.
- [16] C. L. SIEGEL, Topics in Complex Function Theory, Vol. 1, Wiley, New York, 1969.
- [17] J. S. SUMNER, A. A. JAGERS, M. VOWE AND J. ANGLESIO, *Inequalities involving trigonometric functions*, Amer. Math. Monthly **98** (1991), 264–267.
- [18] J. B. WILKER, *Problem E 3306*, Amer. Math. Monthly 96 (1989), 55.
- [19] S.-H. WU AND H. M. SRIVASTAVA, A weighted and exponential generalization of Wilker's inequality and its applications, Integral Transforms and Spec. Funct. 18 (2007), 529–535.
- [20] S.-H. WU AND H. M. SRIVASTAVA, A further refinement of Wilker's inequality, Integral Transforms and Spec. Funct. 19 (2008), 757–765.



- [21] S.-H. WU, On extension and refinement of Wilker's inequality, Rocky Mountain J. Math. 39 (2009), 683–687.
- [22] S.-H. WU AND A. BARICZ, Generalizations of Mitrinović, Adamović and Lazarevic's inequalities and their applications, Publ. Math. Debrecen 75 (2009), 447–458.
- [23] L. ZHANG AND L. ZHU, A new elementary proof of Wilker's inequalities, Math. Inequal. Appl. 11 (2008), 149–151.
- [24] L. Zhu, A new simple proof of Wilker's inequality, Math. Inequal. Appl. 8 (2005), 749–750.
- [25] L. Zhu, On Wilker-type inequalities, Math. Inequal. Appl. 10 (2007), 727-731.
- [26] L. Zhu, Some new inequalities of the Huygens type. Comput. Math. Appl. 58 (2009), 1180–1182.
- [27] L. ZHU, Some new Wilker-type inequalities for circular and hyperbolic functions, Abstr. Appl. Anal. 2009, Article ID 485842.
- [28] L. Zhu, A source of inequalities for circular functions Comput. Math. Appl. 58 (2009), 1998–2004
- [29] L. ZHU, Inequalities for Hyperbolic functions and their Applications, J. Ineq. Appl. Vol. (2010), Article ID 130821.