

A PROOF OF TWO CONJECTURES OF CHAO-PING CHEN FOR INVERSE TRIGONOMETRIC FUNCTIONS

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Abstract. In this paper we prove two conjectures stated by Chao-Ping Chen in [Int. Trans. Spec. Funct. 23:12 (2012), 865–873], using a method for proving inequalities of mixed trigonometric polynomial functions.

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REFERENCES

- [1] C.-P. CHEN, *Sharp Wilker and Huygens type inequalities for inverse trigonometric and inverse hyperbolic functions*, Int. Trans. Spec. Funct. **23**: 12, (2012), 865–873.
- [2] C. HUYGENS, *Oeuvres Complètes 1888–1940*, Société Hollandaise des Science, Haga, Sweden, 1940.
- [3] J. B. WILKER, *Problem E 3306*, Amer. Math. Monthly **96** (1989), p. 55.
- [4] J. S. SUMNER, A. A. JAGERS, M. VOWE AND J. ANGLÉSIO, *Inequalities involving trigonometric functions*, Amer. Math. Monthly **98** (1991), 264–267.
- [5] L. ZHU, *A New Simple Proof of Wilker's Inequality*, Math. Inequal. Appl. **4** (2005), 749–750.
- [6] L. ZHU, *On Wilker-type inequalities*, Math. Inequal. Appl. **10** (2007), 727–731.
- [7] L. ZHANG AND L. ZHU, *A new elementary proof of Wilker's inequalities*, Math. Inequal. Appl. **11** (2007), 149–151.
- [8] 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.
- [9] C. MORTICI, *The natural approach of Wilker-Cusa-Huygens inequalities*, Math. Inequal. Appl. **14** (2011), 535–541.
- [10] Z.-J. SUN AND L. ZHU, *Some Refinements of Inequalities for Circular Functions*, J. Appl. Math. **2011**, Article ID 869261., 9 pp.
- [11] Z.-J. SUN AND L. ZHU, *On New Wilker-Type Inequalities*, ISRN Math. Anal. **2011**, Article ID 681702., 7 pp.
- [12] C.-P. CHEN AND W.-S. CHEUNG, *Wilker- and Huygens-type inequalities and solution to Oppenheim's problem*, Int. Trans. Spec. Funct. **23**: 5, (2012), 325–336.
- [13] C.-P. CHEN AND W.-S. CHEUNG, *Sharpness of Wilker and Huygens type inequalities*, J. Inequal. Appl. **2012**: Art. 72 (2012), 11 pp.
- [14] E. NEUMAN, *Wilker and Huygens-type inequalities for the generalized trigonometric and for the generalized hyperbolic functions*, Appl. Math. Comput. **230** (2014), 211–217.
- [15] E. NEUMAN, *Wilker and Huygens-type inequalities for Jacobian elliptic and theta functions*, Int. Trans. Spec. Funct. **25**: 3, (2014), 240–248.
- [16] C. MORTICI, *A Subtly Analysis of Wilker Inequality*, Appl. Math. Comput. **231** (2014), 516–520.
- [17] L. DEBNATH, C. MORTICI, L. ZHU, *Refinements of Jordan-Steckin and Becker-Stark inequalities*, Results Math. **67** (1), (2015), 207–215.
- [18] E. NEUMAN, *Inequalities for the generalized trigonometric, hyperbolic and Jacobian elliptic functions*, J. Math. Inequal. **9** (3), (2015), 709–726.
- [19] Y. NISHIZAWA, *Sharpening of Jordan's type and Shafer-Fink's type inequalities with exponential approximations*, Appl. Math. Comput. **269** (2015), 146–154.

- [20] B. MALEŠEVIĆ, M. MAKRAGIĆ, *A Method for Proving Some Inequalities on Mixed Trigonometric Polynomial Functions*, J. Math. Inequal. **10** (3) (2016), 849–876.
- [21] B. BANJAC, M. MAKRAGIĆ, B. MALEŠEVIĆ, *Some notes on a method for proving inequalities by computer*, Results Math. **69** (1) (2016), 161–176.
- [22] M. NENEZIĆ, B. MALEŠEVIĆ, C. MORTICI, *Accurate approximations of some expressions involving trigonometric functions*, Appl. Math. Comput. **283** (2016), 299–315.
- [23] B. MALEŠEVIĆ, T. LUTOVAC, B. BANJAC, *A Proof of an Open Problem of Yusuke Nishizawa*, arXiv:math/1601.00083, (2016).