

## ON CERTAIN SERIES INVOLVING RECIPROCALS OF BINOMIAL COEFFICIENTS

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*Abstract.* We evaluate the following family of series involving reciprocals of binomial coefficients in terms of elementary functions for  $m = 3, 4$ .

$$\sum_{k=0}^{\infty} \frac{x^k}{(mk+1)\binom{mk}{k}}.$$

*Mathematics subject classification (2010):* Primary 11Y60; Secondary 40A05..

*Keywords and phrases:* binomial sum, series, binomial coefficients, catalan constant, Apéry constant, integral representations.

## REFERENCES

- [1] R. APERY, *Irrationalité de  $\zeta(2)$  et  $\zeta(3)$* , Journées Arithmétiques de Luminy, Asterisque, **61** (1979), 11–13.
- [2] N. BATIR, *Integral representations of some series involving  $\binom{2k}{k}^{-1} k^{-n}$  and some related series*, Appl. Math. Comput., **147** (2004), 645–667.
- [3] N. BATIR, *On the series  $\sum_{k=1}^{\infty} \frac{x^k}{k^n \binom{3k}{k}}$* , Proc. Indian Acad. Sci. Mathematical Sciences, **115**, 4 (2005), 371–381.
- [4] J. BORWEIN, R. GIRGENSOHN, *Evaluations of binomial series*, Aequationes Math., **70** (2005), 25–36.
- [5] A. I. DAVYDYCHEV AND M. YU. KALMYKOV, *Massive Feynmann diagrams and inverse binomial sums*, Nuclear Physics B, **699**, (1-2) (2004), 3–64.
- [6] A. SOFO, *On sums of binomial coefficients*, Proyecciones, **28**, 1 (2009), 35–45.
- [7] A. SOFO, *Some properties of reciprocals of double binomial coefficients*, Tamsui Oxf. Math. Sci., **25**, 2 (2009), 141–151.
- [8] A. SOFO, *Harmonic numbers and double binomial coefficients*, Integr. Transf. and Spec. F., **20**, 11 (2009), 847–857.
- [9] A. SOFO, *Some estimates and identities involving reciprocals of binomial coefficients*, The 50<sup>th</sup> Annual Meeting of the Australian Math Soc., 25–29 September, 2006, Macquarie University.
- [10] A. SOFO, *Integrals and polygamma function representations for binomial sums*, J. Integer Sequences, **13** (2010), Article 10.2.8.
- [11] R. SPRUGNOLI, *Sums of reciprocals of certain binomial coefficients*, Electronic J. Combin., Number Theory, **6** (2006), 1–17.
- [12] B. SURY, TIANMING WANG AND FENG-ZHEN ZHAO, *Some identities involving reciprocals of Binomial coefficients*, J. Integer Sequences, **7** (2004), Article 04.2.8.
- [13] JIN-HUA YANG, FENG-ZHEN ZHAO, *Certain sums involving inverses of binomial coefficients and some integrals*, J. Integer Sequences, **10** (2007), Article 07.8.7.
- [14] Z. NAN-YUE AND K.S. WILLIAMS, *Values of the Riemann zeta function and integrals involving  $\log(\sinh \frac{\theta}{2})$  and  $\log(\sin \frac{\theta}{2})$* , Pacific J. Math., **168**, 2 (1995), 271–289.
- [15] X. WANG, *Integral representations and binomial coefficients*, J. Integer Sequences, **13** (2010), Article 10.6.4.

- [16] FENG-ZHEN ZHAO AND TIANMING WANG, *Some results for sums of the inverse binomial coefficients*, Integers, **5** (2005), A22.
- [17] I. J. ZUCKER, *On the series  $\sum_{k=1}^{\infty} \binom{2k}{k}^{-1} k^{-n}$  and related sums*, J. Number Theory, **20** (1985), 92–102.