

## ON HILBERT'S INEQUALITIES WITH ALTERNATING SIGNS

CHANG-JIAN ZHAO AND WING-SUM CHEUNG

*Abstract.* Some new Hilbert type inequalities with alternating signs are established. These also generalize some existing results of Hilbert type inequalities in the literature.

*Mathematics subject classification (2010):* 26D15.

*Keywords and phrases:* Hilbert's inequality, Hilbert's inequality with alternating signs, Hölder's inequality, Jensen's inequality, Young's inequality.

### REFERENCES

- [1] G. H. HARDY, J. E. LITTLEWOOD AND G. PÓLYA, *Inequalities*, Cambridge Univ. Press, Cambridge, 1934.
- [2] D. S. MITRINOVIĆ, *Analytic Inequalities*, Springer-Verlag, Berlin, New York, 1970.
- [3] B. C. YANG, *On Hilbert's integral inequality*, J. Math. Anal. Appl. **220** (1988), 778–785.
- [4] M. Z. GAO, T. LI, *Some improvements on Hilbert's integral inequality*, J. Math. Anal. Appl. **229** (1999), 682–689.
- [5] M. Z. GAO, B. C. YANG, *On the extended Hilbert's inequality*, Proc. Amer. Math. Soc. **126** (1998), 751–759.
- [6] J. C. KUANG, *On new extensions of Hilbert's integral inequality*, J. Math. Anal. Appl. **235** (1999), 608–614.
- [7] J. C. KUANG, L. DEBNATH, *On Hilbert type inequalities with non-conjugate parameters*, Appl. Math. Lett. **22** (2009), 813–818.
- [8] M. KRNIĆ, J. PEČARIĆ, *Extension of Hilbert's inequality*, J. Math. Anal. Appl. **324** (2006), 150–160.
- [9] Z. LV, M. Z. GAO, L. DEBNATH, *On new generalizations of the Hilbert integral inequality*, J. Math. Anal. Appl. **326** (2007), 1452–1457.
- [10] B. G. PACHPATTE, *Inequalities similar to certain extensions of Hilbert's inequality*, J. Math. Anal. Appl. **243** (2000), 217–227.
- [11] G. A. ANASTASSIOU, *Hilbert-Pachpatte type fractional integral inequalities*, Math. Compu. Mode. **49** (2009), 1539–1550.
- [12] J. JIN, L. DEBNATH, *On a Hilbert-type linear series operator and its applications*, J. Math. Anal. Appl. **371** (2010), 691–704.
- [13] B. C. YANG, *A half-discrete Hilbert-type inequality with a non-homogeneous kernel and two variables*, Mediterranean J. Math. **10** (2) (2013), 677–692.
- [14] G. D. HANDLEY, J. J. KOLIHA AND J. E. PEČARIĆ, *New Hilbert-Pachpatte type integral inequalities*, J. Math. Anal. Appl. **257** (2001), 238–250.
- [15] Z. T. XIE, *A new reverse Hilbert-type inequality with a best constant factor*, J. Math. Anal. Appl. **343** (2008), 1154–1160.
- [16] C. J. ZHAO, L. DEBNATH, *Some new inverse type Hilbert integral inequalities*, J. Math. Anal. Appl. **262** (2001), 411–418.
- [17] C. J. ZHAO, W. S. CHEUNG, *Reverse Hilbert's type integral inequalities*, Math. Inequal. Appl. **17** (4) (2014), 1551–1561.
- [18] B. G. PACHPATTE, *On some new inequalities similar to Hilbert's inequality*, J. Math. Anal. Appl. **226** (1998), 166–179.
- [19] G. S. DAVIES, G. M. PETERSON, *On an inequality of Hardy's (II)*, Quart. J. Math. **15** (1964), 35–40.