

## THE GENERALIZED TSALLIS RELATIVE OPERATOR ENTROPY VIA SOLIDARITY

ROZARIJA MIKIĆ, JOSIP PEČARIĆ, IVAN PERIĆ AND YUKI SEO

**Abstract.** In this paper, some operator inequalities related to the solidarity and the generalized Tsallis relative operator entropy are shown. As an application, we show the Shannon type operator inequalities and its reverse in terms of the generalized Tsallis relative operator entropy.

*Mathematics subject classification (2010):* 47A63, 47A64.

*Keywords and phrases:* Solidarities, Ando type inequality, the generalized Tsallis relative operator entropy, Shannon type inequality.

### REFERENCES

- [1] T. ANDO, *Topics on operator inequalities*, Hokkaido Univ. Lecture Note, 1978.
- [2] T. ANDO, *Concavity of certain maps on positive definite matrices and applications to Hadamard products*, Linear Algebra Appl., **26** (1979), 203–241.
- [3] J. I. FUJII, *The relative operator entropy via operator means*, Thesis, 1993.
- [4] J. I. FUJII, M. FUJII AND YUKI SEO, *An extension of the Kubo-Ando theory: Solidarities*, Math. Japon., **35** (2) (1990), 387–396.
- [5] J. I. FUJII AND E. KAMEI, *Uhlmann's interpolational method for operator means*, Math. Japon., **34** (1988), 541–547.
- [6] J. I. FUJII AND E. KAMEI, *Relative operator entropy in noncommutative information theory*, Math. Japon., **34** (1989), 341–348.
- [7] J. I. FUJII AND E. KAMEI, *Interpolational paths and their derivatives*, Math. Japon., **39** (1994), 557–560.
- [8] M. FUJII, J. MIĆIĆ HOT, J. PEČARIĆ AND Y. SEO, *Recent Developments of Mond-Pečarić Method in Operator Inequalities*, Monographs in Inequalities 4, Element, Zagreb, 2012.
- [9] S. FURUCHI, K. YANAGI AND K. KURIYAMA, *Fundamental properties of Tsallis relative entropy*, J. Math. Phys., **45** (2004), 4868–4877.
- [10] S. FURUCHI, K. YANAGI AND K. KURIYAMA, *A note on operator inequalities of Tsallis relative operator entropy*, Linear Algebra Appl., **407** (2005), 19–31.
- [11] T. FURUTA, *Parametric extensions of Shannon inequality and its reverse one in Hilbert space operators*, Linear Algebra Appl., **381** (2004), 219–235.
- [12] T. FURUTA, *Two reverse inequalities associated with Tsallis relative operator entropy via generalized Kantorovich constant and their applications*, Linear Algebra Appl., **412** (2006), 526–537.
- [13] T. FURUTA, J. MIĆIĆ HOT, J. PEČARIĆ AND Y. SEO, *Mond-Pečarić Method in Operator Inequalities*, Monographs in Inequalities 1, Element, Zagreb, 2005.
- [14] H. ISA, M. ITO, E. KAMEI, H. TOHYAMA AND M. WATANABE, *Relative operator entropy, operator divergence and Shannon inequality*, Sci. Math. Japon., **75** (2012), 289–298.
- [15] H. ISA, M. ITO, E. KAMEI, H. TOHYAMA AND M. WATANABE, *Extensions of Tsallis relative operator entropy and operator valued distance*, Sci. Math. Japon., **76** (2013), 427–435.
- [16] H. ISA, M. ITO, E. KAMEI, H. TOHYAMA AND M. WATANABE, *Generalization of operator Shannon inequality based on Tsallis and Renyi relative entropies*, Linear Algebra Appl., **439** (2013), 3148–3155.
- [17] R. JAKŠIĆ, J. PEČARIĆ AND I. PERIĆ, *Reverses of Ando Davis-Choi inequality*, to appear in JMI.
- [18] F. KUBO AND T. ANDO, *Means of positive linear operators*, Math. Ann., **246** (1980), 205–224.

- [19] J. MIKIĆ, J. PEČARIĆ AND Y. SEO, *Complementary inequalities to inequalities of Jensen and Ando based on the Mond-Pečarić method*, Linear Algebra Appl., **318** (2000), 87–107.
- [20] K. YANAGI, K. KURIYAMA AND S. FURUICHI, *Generalized Shannon inequalities based on Tsallis relative operator entropy*, Linear Algebra Appl., **394** (2005), 109–118.