

THE STEFFENSEN–POPOVICIU MEASURES IN THE CONTEXT OF QUASICONVEX FUNCTIONS

CONSTANTIN P. NICULESCU AND MARIUS M. STĂNESCU

Abstract. We discuss the extension of Jensen’s inequality to the framework of quasiconvex functions and of signed measures.

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REFERENCES

- [1] A. CAMBINI AND L. M. MARTEIN, *Generalized Convexity and Optimization. Theory and Applications*, Lecture Notes in Economics and Mathematical Systems **616**, Springer-Verlag, Berlin Heidelberg, 2009.
- [2] A. M. FINK, *A best possible Hadamard Inequality*, Math. Inequal. Appl. **1** (1998), 223–230.
- [3] A. FLOREA AND C. P. NICULESCU, *A Hermite-Hadamard inequality for convex-concave symmetric functions*, Bull. Math. Soc. Sci. Math. Roumanie **50**, 2 (2007), 149–156.
- [4] P. C. HAMMER, *The midpoint method of numerical integration*, Math. Mag. **31** (1958), 193–195.
- [5] E. HEWITT AND K. M. STROMBERG, *Real and Abstract Analysis*, Springer-Verlag, Second printing corrected, Berlin Heidelberg New York, 1969.
- [6] R. A. HORN AND CH. R. E. JOHNSON, *Matrix analysis*, Cambridge University Press, Cambridge, 2013.
- [7] J. L. W. V. JENSEN, *Sur les fonctions convexes et les inégalités entre les valeurs moyennes*, Acta Math. **30** (1906), 175–193.
- [8] S. JOHANSEN, *A Representation Theorem for a Convex Cone of Quasi Convex Functions*, Math. Scandinavica **30** (1972), 297–312.
- [9] S. KEROV, *Interlacing measures*, Preprint LaBRI 1116-96 (1996) 1–53, Université de Bordeaux-I, published in Kirillov’s seminar on representation theory, Amer. Math. Soc. Transl. Ser. 2, **181**, Amer. Math. Soc., RI, 35–83 (1998), Providence, 1998.
- [10] S. M. MALAMUD, *Inverse spectral problem for normal matrices and the Gauss-Lucas theorem*, Trans. Amer. Math. Soc. **357** (2005), 4043–4064.
- [11] M. V. MIHAI AND C. P. NICULESCU, *A simple proof of the Jensen type inequality of Fink and Jodeit*, Mediterr. J. Math. **13**, 1 (2016), 119–126.
- [12] K. S. MILLER AND S. G. SAMKO, *Completely monotonic functions*, Integr. Transf. and Spec. Funct. **12**, 4 (2001), 389–402.
- [13] C. P. NICULESCU, *Choquet theory for signed measures*, Math. Inequal. Appl. **5** (2002), 479–489.
- [14] C. P. NICULESCU, *The Hermite-Hadamard inequality for functions of a vector variable*, Math. Inequal. Appl. **5** (2002), 619–623.
- [15] C. P. NICULESCU, *On a result of G. Bennett*, Bull. Math. Soc. Sci. Math. Roumanie **54** (2011), 261–267.
- [16] C. P. NICULESCU AND L. E. PERSSON, *Convex Functions. Basic Theory and Applications*, Universitaria Press, Craiova, 2003.
- [17] C. P. NICULESCU AND L. E. PERSSON, *Old and new on the Hermite-Hadamard inequality*, Real Analysis Exchange **29**, 2 (2003/2004), 663–686.

- [18] C. P. NICULESCU AND L. E. PERSSON, *Convex Functions and their Applications. A Contemporary Approach*, CMS Books in Mathematics Vol. 23, Springer-Verlag, Berlin-Heidelberg-New York, 2006.
- [19] C. P. NICULESCU AND I. ROVENȚA, *Relative Convexity and Its Applications*, Aequationes Math. **89**, 5 (2015), 1389–1400.
- [20] C. P. NICULESCU AND C. SPIRIDON, *New Jensen-type inequalities*, J. Math. Anal. Appl. **401**, 1 (2013), 343–348.
- [21] J. PEČARIĆ, F. PROSCHAN AND Y. L. TONG, *Convex functions, partial orderings, and statistical applications*, Academic Press, Boston, 1982.
- [22] R. R. PHELPS, *Lectures on Choquet's Theorem*, 2nd ed., Springer-Verlag, Berlin-Heidelberg-New York, 2001.
- [23] T. POPOVICIU, *Notes sur les fonctions convexes d'ordre supérieur (IX)*, Bull. Math. Soc. Roum. Sci. **43** (1941), 85–141.
- [24] D. ROMIK, *Explicit formulas for hook walks on continual Young diagrams*, Adv. Appl. Math. **32** (2004), 625–654.
- [25] B. SIMON, *Convexity. An Analytic Viewpoint*, Cambridge University Press, Cambridge, 2011.
- [26] J. ŠREMR, *Absolutely continuous functions of two variables in the sense of Carathéodory*, Electronic Journal of Differential Equations (EJDE-2010) **154** (2010), 1–11.
- [27] J. F. STEFFENSEN, *On certain inequalities and methods of approximation*, J. Inst. Actuaries **51** (1919), 274–297.
- [28] E. TALVILA AND M. W. WIERSMA, *Simple derivation of basic quadrature formulas*, Atlantic Electronic Journal of Mathematics **5**, 1 (2012), 47–59.